WAVETEK

RMS225 Digital Multimeter

Service Manual

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WAVETEK

RMS225 Digital Multimeter

Service Manual

WAVETEK
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Wavetek is in the process of changing product identification to reflect the new ownership. In the interim, there may be some inconsistency in labeling.

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Table of Contents

Section I Introduction 1
Specifications 1
Ranges 2
DC Volts 2
AC Volts 2
DC Current 2
AC Current 2
Resistance 3
Diode Continuity 3

Section II Functional Description 5
Major Components 5
RMS to DC Voltage Converter (U3) 6
Analog to Digital Converter (U1) 6
Microprocessor (U2) 6
Connectors 6
Input Protection and Conditioning 6
Overload Protection for V-Ω Jack 6
Signal Conditioning 6
Voltage 6
Voltage Reference 7
Microprocessor Peripherals 7
Display 7
System Clock 7
Feature Select Push Buttons and Internal Switches 7
Troubleshooting 8

Section III Customer Service 9
3 Year Warranty Against Defects 9
After-Warranty Repair or Exchange Service 9
Calibration Service 9

Section IV Service Procedures 11
Warnings and Precautions 11
Cleaning Instructions 11
Required Tools and Equipment 11
Battery Replacement 12
Self-Resetting Fuse (PTC Version) 12
Removal and Replacement of the Self-Resetting Fuse 12

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Calibration 13
Calibration Procedure for RMS225 13
Meter Disassembly 14
Elastomer Connectors, Cleaning and Replacement Procedure 15
Self-Resetting Fuse (PTC Version) 15
Removal and Replacement of the Self-Resetting Fuse 16
Segment Display Test 16

Section V Replacement Parts and Schematics 17

Section VI Factory Service 55
Service Centers - United States of America 56
Service Centers - Canada 57
Service Centers - Foreign 57

Section I Introduction

The Beckman Industrial RMS225 autoranging digital multimeter measures the electrical functions of voltage, current, resistance, and tests continuity and diode junctions. Front panel push buttons provide the operator with the ability to select the desired meter special features; Range Lock, Probe Hold™, Relative Mode, or Auto Min Max™ Mode.

The meter operates on one of two modes: Range Lock or autoranging. Range Lock allows the function range to be set to a specified range. The autoranging feature provides fast automatic adjustment to the appropriate measurement range, allowing easy hands-off operation. For further information, refer to the RMS225 Operator's Manual.

Other unique features to the RMS225 multimeter include:

Auto-Power Down (Battery Saver)	Protective Holster
Dangerous Voltage Indication	Overload Alert™

The meter features a compact design for easy handling. It is constructed of a tough, internally braced case with rounded corners and edges.

Specifications

This section provides various specifications, including physical, mechanical, and environmental, along with other parameters of the Beckman Industrial RMS225 multimeter.

Physical		
Height:	173 mm (6.81 in.)	(Measurements do not include Holster.)
Width:	71mm (2.79 in.	
Depth:	32mm (1.26 in.)	
Weight:	326g (11.51 oz.)	
Mechanical		
Shock and Vibration:	MIL-T-28800, class II	
Case Material:	Fire retardant, high impact thermoplastic	
Environmental		
Operating Temperature		
Temperature:	0 to 50°C	
Relative Humidity:	0 to 80%	
Storage Temperature		
Temperature:	-40 to 70°C	
Relative Humidity:	0 to 95% (battery removed)	
Temperature Coefficient:	<0.1 x (specified accuracy) per °C (0 to 20°C, 30 to 50°C)	
Calibration:	Accuracy specifications guaranteed for one year.	
Battery		
Type:	9VDC, NEDA type 1604	
Life:	1000 hours (typical alkaline)	
Transient Protection		
AC/DC Voltages Ranges:	6000V (V-Ω input jacks shunted by 250pf capacitor). Pulse width 10µs. Pulse rise time (max.) 10µs.	

Ranges

DC Volts

Range	Resolution	Accuracy
1V	0.1mV	0.25% ±6 counts
10V	1.0mV	0.25% ±3 counts
100V	10.0mV	0.25% ±3 counts
1000V	100mV	0.25% ±3 counst (to 400VDC) 0.40% ±3 counts (400 to 1000VDC)

Input Impedance: 10MΩ
Common Mode Rejection Ratio: Greater than 120dB to 1000VDC.
Normal Mode Rejection Ratio: Greater than 60dB at 50/60Hz.
Overload Protection 1000VDC.

AC Volts

Range	Input	Resolution	Frequency	Accuracy (Crest Factor ≤ 1.5)
10V	0.2 to 10V	1mV	45Hz to 10kHz	±1.5% ±8 counts
100V	2.0 to 29.9V	10mV	45Hz to 10kHz	±1.5% ±8 counts
	2.0 to 29.9V	10mV	10Hz to 30kHz	±2.5% ±8 counts
	30 to 100V	10mV	45Hz to 1kHz	±1.5% ±8 counts
750 V	20 to 750V	100mV	45Hz to 1kHz	±1.5% ±8 counts

Conversion Type: True RMS (AC coupled).
Input Impedance: 10MΩ shunted by less than 100pf.
Overload Protection:<10Hz, 400VAC or 533V peak (max.);
>10Hz, 750VAC or 1000V peak (max.).

DC Current

Range	Resolution	Accuracy	Voltage Burden (max.)
10mA	1.0μA	0.75% ±8 counts	20mV/mA
40mA	10μA	0.75% ±8 counts	20mV/mA
1-A	1.0mA	0.75% ±8 counts	30mV/A

Overload Protection: Both ranges fused: 40mA range, 0.25A @ 600V-10A range, 15A @ 600V.

AC Current

Range	Input	Resolution	Frequency	Accuracy (Crest Factor ≤ 1.5)	Voltage Burden (max.)
10mA	0.2 to 10mA	1.0μA	45Hz to 1kHz	±1.75% ±3 counts	20mV/mA
40mA	0.2 to 40mA	10μA	45Hz to 1kHz	±1.75% ±3 counts	20mV/mA
10A	0.2 to 10A	10mA	45Hz to 1kHz	±1.75% ±3 counts	30mV/A

Conversion Type: True RMS (AC coupled).
Overload Protection: Both ranges fused: 40mA range, 0.25A @ 600V-10 range, 15A @ 600V.

Resistance

Range	Resolution	Accuracy	Test Current (max.)	Open Circuit Voltage (max.)
1kΩ	0.1Ω	0.5% ±1 count	1.0mA	3.3V
10kΩ	1.0Ω	0.5% ±1 count	150μA	1.3V
100kΩ	10Ω	0.5% ±1 count	15μA	1.3V
1MΩ	100Ω	0.5% ±1 count	1.5μA	1.3V
10MΩ	1.0kΩ	0.5% ±2 counts	0.2μA	1.3V
40MΩ	10kΩ	1.5% ±2 counts	0.2μA	1.3V

Overload Protection: 500VDC or VAC.

Diode/Continuity

Range	Resolution	Accuracy	Short Circuit Current (max.)	Open Circuit Voltage (max.)
1.0V	0.1mV	1.0% ±1 count	4.5mA	3.3V
2.25V	1.0mV	1.0% ±1 count	4.5mA	3.3V

Continuity Threshold: less than 100mV.
Overload Protection: 500VDC or RMS.

The RMS225 digital multimeter is constructed of a two-piece protective case, two circuit boards, LCD display, front panel rotary switch, and push buttons. The two circuit boards, Input and Display boards (Display Board is the smaller of the two), are separated by a conductive spacer that is connected to the meter's analog ground. The spacer provides a physical path for a zebra connector which electrically connects the two boards.

Major Components

The main electronic components of the meter are three integrated circuits, U1, U2, and U3. A block diagram of the RMS225 multimeter is shown in Figure 1. U1 is an analog dual slope digital converter with an internal microprocessor interface. U2 is a four-bit microprocessor with LCD driver. U3 is an root-mean-square (RMS) to DC voltage converter.

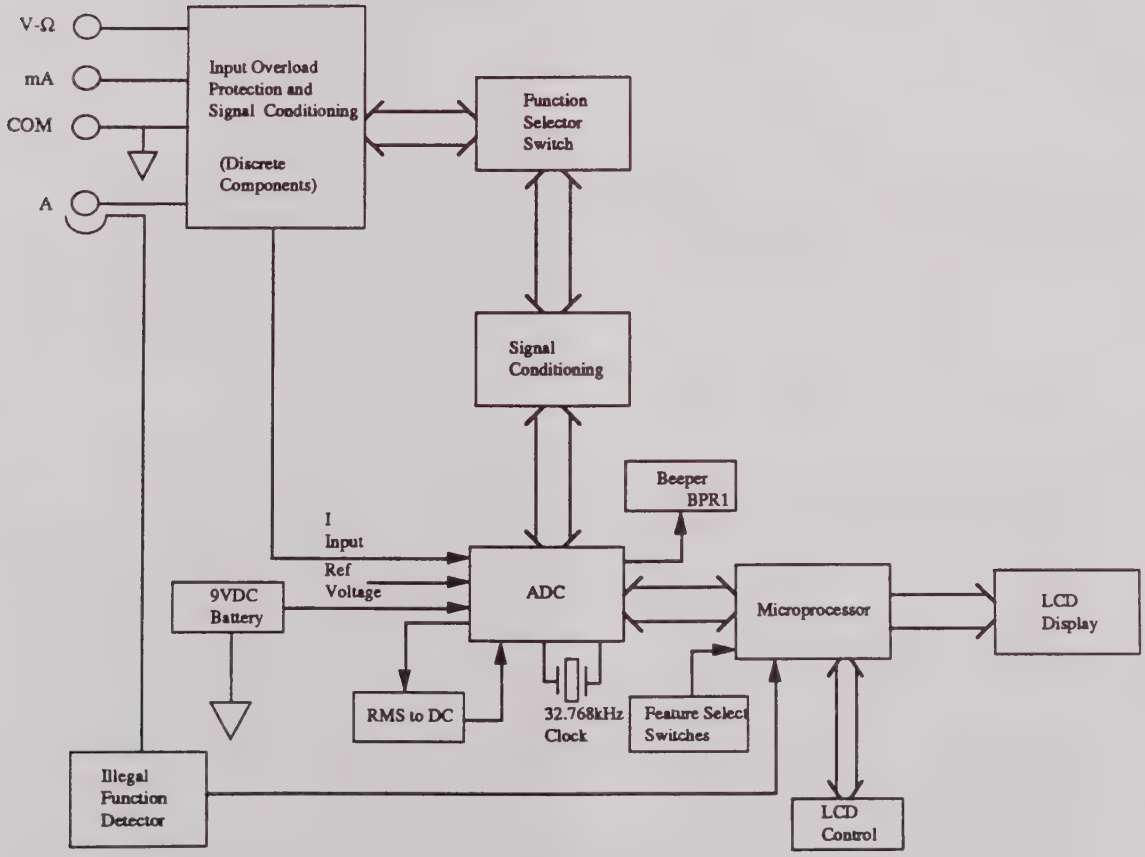


Figure 1. Simplified Block Diagram of the RMS225.

RMS to DC Voltage Converter (U3)

The RMS-to-DC voltage converter (U3) is located on the Input Board. This AC coupled converter changes the RMS value of an AC input voltage to a DC voltage. This DC voltage output is an input to the ADC (U1).

Analog to Digital Converter (U1)

The dual slope analog to digital converter (ADC) (U1) is located on the Input Board. It also contains the following internal circuitry: attenuator range switches, beeper driver, active filter, low battery detector, mode selection, and both analog and digital power supplies.

This IC provides all of the logic and counter functions required to execute the A/D conversion. The attenuator range switches and mode selection are controlled by the microprocessor (U2).

Microprocessor (U2)

The 4-bit microprocessor (U2) is located on the Display Board. It controls the operation of the meter and drives the LCD display. The microprocessor features a 4-bit arithmetic logic unit (ALU), 4K x 8 program memory (masked ROM), 256 x 4 data memory (RAM), programmable 8-bit timer/event counter, and an LCD controller/driver.

The LCD controller/driver manages the timing required for the display to operate in a triplex mode (32 segments by three common drivers).

Connectors

Zebra connector Z1 is placed through the conductive spacer and provides the electronic connection between the Input Board and the Display Board. Zebra connectors Z2 and Z3 connect the LCD display to the Display Board. A zebra connector consists of conductive carbon traces sandwiched between to foam pads.

Connector P5 supplies B+ voltage and digital ground to the Display Board from the Input Board.

Input Protection and Conditioning

Overload Protection for V-Ω Jack

Input protection for the VΩ jack (J1) is provided by R2, RT1, and RV1. R2 is a 220Ω fusable resistor that opens during periods of extremely high energy. RT1 is a positive temperature coefficient (PTC) thermistor of which the resistance value rises from 750Ω to a high impedance during periods of sustained overvoltage while the meter is set for either the resistance or diode/continuity test functions. The impedance level of the RT1 is dependent on the overload severity, as the overload increases so does the impedance. RV1 is a metal-oxide varistor that begins conducting when the input voltage reaches 1720 volts, and clamps at 2500 volts.

Signal Conditioning

Voltage

In the AC and DC voltage functions, signals enter the meter through VΩ jack J1 to the input protection circuitry of R2, RT1, and resistor network RN1.

When AC volts is selected, switches S1 through S3 are open so the signal is AC coupled VIA C2 to pin 18 of the ADC. The series combination of R40 and C27 provide feed forward in AC volts.

When the Ω is selected, switches S1 through S3 are closed and the signal is directly coupled from pin 2 of RN1 to pin 18 of the ADC. The ADC switches to the appropriate range by selecting input from either pin 19 through 22 of U1 through the ADC and output to pin 18. This provides a divide by 10, 100, 1,000, 10,000 of the J1 input for accurate signal measurement.

The correct range is selected by first enabling the 1.11MΩ resistor, through pin 19 of U1, thus dividing the signal by a factor of 10. If an overvoltage condition is detected, U1 switches from pin 19 to pin 20. The 101.01kΩ resistor divides the signal by 100. This switching process continues until the correct range is found. If the signal exceeds the meter's capabilities, input overload "I OL" is displayed. The loop is completed when the signal reaches COM jack (J2).

> **Note**
>
> AC frequency response is provided by capacitors C3 through C6, C28, and C29. Variable trim capacitors C28 and C29 are adjusted during calibration of the multimeter.

Voltage Reference

Zener diode CR2 is a precision +1.235 volt bandgap reference diode. Resistor R5 limits current to CR2 to approximately 70μA. The +1.235VDC is a reference voltage for pin 35 of U1 and the voltage divider (R6, R7, and R8). The 545mV output from the voltage divider is an input to pin 29 of U1.

Microprocessor Peripherals

Display

The LCD is mounted in the front half of the cane and is held next to the push button array by pressure from zebra connectors (Z2 and Z3), Spacer, and the Display Board. The display in connected to the Display Board through two zebra connectors, Z2 and Z3. Support components are R27, R28, R29, R25, CR8, CR9, C20, C21, C22, and Q4. Potentiometer R26 is the contrast drive voltage adjustment.* Components Q4, CR8, CR9, and R25 provide over-temperature drive compensation.

* Only on PTC models. Display board on schematic 1000-0064-00.

System Clock

An RC oscillator is formed by components R32 and C19. The oscillator frequency is approximately 400kHz. This is located on display board.

Feature Select Push Buttons and Internal Switches

The front panel feature select push buttons. SELECT, MENU, and CLEAR (S2, S3, and S4, respectively) are inputs to the microprocessor. Resistors R36, R35, and R34 are the accompanying pull-down resistors.

Front panel rotary Function Selector Switch (S1) serves three purposes; power (on/off), circuit configuration, and control. Switch S1-7 controls the power and was discussed earlier.

Switches S1-1 through S1-6, and S1-8 configure the meter circuitry according to the electrical function that the operator has selected (voltage, current, resistance, or continuity/diode junction test).

Switches S1-9 through S1-11 activate feature select control lines which are input to the microprocessor in conjunction with the push button signals. The pull-up resistors for are R37, R38, and RN2. RN2 also contains pull-up resistors for the digital communication lines between the ADC (U1) and the microprocessor.

Troubleshooting

The following voltage readings are measured with respect to analog ground while the meter is "on." Connect the ground test probe to the shield of resistor network RN1 on the Input Board for analog ground and the voltage test probe to the following test point locations. Nominal voltage readings and tolerances are provided.

Test Point	Board	Voltage Reading
pin 29, U1	Input Board	≈545mV
B+, (RN2 pin 1)	Input Board	3.05VDC ±0.25V
U3, pin 7	Input Board	6.5VDC ±1.5V
Vss (TP4)	Input Board	(B+) - (BT1)VDC

The following voltage readings are measured with respect to digital ground while the meter is "on." Connect the ground test probe to TP5 on the Input Board for digital ground and the voltage test probe to the following test point locations. Nominal voltage readings and tolerances are provided.

Test Point	Board	Voltage Reading
TP9	Display Board	300kHz to 500kHz square wave from 0 to 5VDC
B+, (RN2 pin 1)	Input Board	5.0VDC ±0.5V
TP6	Input Board	0VDC ±0.3V

3 Year Warranty Against Defects

The RMS224 multimeter is warranted against all defects of material or workmanship which develop for any reason whatsoever, except abuse, within a period of three (3) years of the date of purchase of the multimeter by the original buyer. This warranty is extended only to the original buyer or original user of the multimeter, who must present proof of purchase at the time of warranty service.

In the USA any multimeter claimed to be defective during the warranty period should be returned with proof of purchase to a Beckman Industrial Factory Service Center. Repair is typically made within two working days. Follow the shipping instructions as detailed in the service section at the back of this manual. For warranty repair outside the USA, contact your local Beckman Industrial dealer, or distributor where your multimeter was purchased, or return it to a Beckman Industrial Factory Service Center.

ANY IMPLIED WARRANTIES ARISING OUT OF THE SALE OF A BECKMAN INDUSTRIAL MULTIMETER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ABOVE STATED PERIODS. BECKMAN INDUSTRIAL SHALL NOT BE LIABLE FOR LOSS OF USE OF THE MULTIMETER OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, OR ECONOMIC LOSS, OR FOR ANY CLAIM OR CLAIMS FOR SUCH DAMAGE, EXPENSES, OR ECONOMIC LOSS.

Some states do not allow limitations on how long implied warranties last or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may no apply to you.

This warranty gives you specific legal rights, and you may also have rights which vary from state to state.

After-Warranty Repair or Exchange Service

After-warranty service is provided by Beckman Industrial Corporation in two ways. You may elect to have your instrument repaired at an authorized Beckman Industrial repair facility, or you can exchange your defective out-of-warranty instrument for a reconditioned instrument at a flat rate as listed on Beckman Industrial's current price list. Contact any authorized Beckman Industrial Distributor or Beckman Industrial Corporation, for the current non-warranty replacement rates and instructions for shipping the instrument.

Calibration Service

Each Beckman Industrial multimeter should be calibrated once a year or after it is repaired. The procedure to accomplish this is contained in this manual. If you do not have the necessary equipment specified to complete calibration, this can be performed by an authorized Beckman Industrial Service Center. If you wish to take advantage of this service, contact any authorized Beckman Industrial Distributor, repair facility, or Beckman Industrial Corporation for current calibration rates and instructions for shipping the instrument.

This section provides the qualified service technician with instructions for cleaning, battery removal and replacement and disassembly and reassembly as well as a summary of warnings and precautions.

WARNINGS!

When used in this manual is to advise the user of a hazard that could result in serious injury or even death. The Symbol "W" refers to the user to the "WARNINGS AND PRECAUTIONS" in this section.

PRECAUTIONS!

When used in this manual is to advise the user of a hazard that could cause damage or malfunction in the instrument. The symbol "P" refers the user to the "WARNINGS AND PRECAUTIONS" in this section.

"W"	**WARNING** **To avoid electrical shock, disconnect the meter from all voltage sources before the case is opened. Close the case before returning the meter to service.**

"P"	**PRECAUTION** **Before performing any calibration or repair procedures, make sure you are wearing a wrist or ankle ground strap to prevent component damage due to electrostatic discharge.**

Cleaning Instructions

The RMS225 multimeter may be wiped clean with a damp soft cloth. To prevent scratching of the protective display lens, it should be cleaned with lens paper or a nonabrasive cloth that is specially designed for cleaning acrylic plastic.

Required Tools and Equipment

The tools required for calibration, maintenance, and repair of the RMS225 multimeter include the following:

Fluke 5100 calibrator or equivalent source
#1 Phillips head screwdriver
Small flat blade screwdriver
Jewelers flat blade screwdriver (for calibration)
Calibrated voltmeter (for calibration) with at least 0.01V resolution and 0.1% (rdg) accuracy.
Stable power supply (for calibration) with at least 0.001V resolution and 0.1% (rdg) accuracy.

Battery Replacement

When the symbol on the display is lit, less than 50 hours of battery life remains. The following steps describe battery removal and replacement.

1. Turn the multimeter off and remove the test probes.
2. Remove multimeter from holster.
3. Turn the multimeter upside down. Unscrew the four rear screws and remove the rear cover.
4. Remove and replace the battery with a NEDA type 1604 or equivalent 9VDC alkaline battery.
5. After installing a new battery, replace the rear cover. Install and tighten the four screws.
6. Reinstall multimeter into holster.

Self-Resetting Fuse (PTC Version)

The 40mA input jack is protected by a self-resetting fuse (positive temperature coefficient resistor). When overloaded, the resistance of the self-resetting fuse increases in value and limits the overload current to a safe level.

Once the overload is removed, the operator should allow five minutes for the fuse to return to its normal value.

To test the self-resetting fuse and the current protection circuitry, set the meter to ohms (Ω) and touch the V-Ω test probe to the 40mA input jack. The meter should read less than 20Ω or greater, replace the self-resetting fuse.

Removal and Replacement of the Self-Resetting Fuse

The following steps describe removal and replacement of the self-resetting fuse.

1. Turn the multimeter off and remove the test probes.
2. Turn the multimeter upside down. Unscrew the four rear screws and remove the rear cover.
3. Disconnect the battery.
4. Remove the Input Board by unscrewing the PCB mounting screw located near the center of the board. Gently lift the board straight up.
5. For the location of the leads and mounting screws refer to drawing number 1000-0069-00.
6. Replace the self-resetting fuse with new component.
7. Reinstall Input Board in the case and tighten the board mounting screw.
8. Reconnect the battery.
9. Replace the rear cover and tighten the four screws.

Calibration

To maintain the accuracy specifications of the RMS225 digital multimeter, it is recommended that the multimeter be calibrated at least once a year and after all repairs.

Calibration consists of applying both a calibrated DC and AC voltage for the appropriate display reading. See engineering drawings.

Calibration Procedure for RMS225

Check meter calibration at the following points:

RANGE	INPUT	MIN	MAX	ANNUNCIATORS
0VDC	OV	-000.6	000.6	mV
1VDC	2.5 + V	2.488	2.512	+ V
VAC	0V	0.000	0.008	V Sine
1AC	2.5V @ 1kHz	2.455	2.546	V Sine
10VA @ 60Hz	25V @ 1kHz	24.55	25.46	V Sine Spark

If adjustment is needed proceed with steps 1 through 3. If not, go to step 4.

Note
All locations noted looking at PC Board not LCD

1. a. LCD Adjust (Self-resetting fuse models only)
   Set meter to VDC without rear case. Short volt and com inputs. Adjust (R26) display for sharp LCD segments without ghosting (lower left pot).

1. b. Basic Calibration
   Set meter to VDC without rear case. Check Display for ±000.0 ±0.6. Set calibrator to +2.5V and connect to input jacks. Adjust (R6) DC Cal for 2.500 on display (upper right pot). Reverse input leads and note reading. The absolute reading should be the same ±0.001.

2. AC Calibration
   Set meter to VAC without rear case. Set calibrator to '+0VDC'. Check display for 0.000 ±0.008. Set calibrator to '2.5V @ 60Hz. Adjust (R15) AC Full Scale for 2.500 ±0.002 on display (upper left pot). Set calibrator to 2.5V @ 10kHz. Adjust (C28) for 2.510 ±0.004 on display (lower right cap). Set calibrator to 25V @ 10kHz. Adjust (C29) for 25.10 ±0.04 on display (right center cap).

3. AC Frequency Response Verification

RANGE	INPUT	MIN.	MAX.	
1VAC @ 1kHz	0.8 V @ 1kHz	0.780	0.820	V Sine
1VAC @ 10kH	0.8 V @ 10kHz	0.780	0.820	V Sine
1VAC @ 60Hz	2.5 V @ 60Hz	2.455	2.546	V Sine
1VAC @ 10kHz	2.5 V @ 10kHz	2.455	2.546	V Sine
10VAC @ 10kHz	25 V @ 10kHz	24.55	25.46	V Sine

4. Attach rear case and perform range tests listed in step 5.

5. Range Tests

RANGE	INPUT	MIN	MAX	ANNUNCIATORS
1VAC	0V	0.000	0.008	V Sine
10VAC @ 60Hz	0.8V @ 60Hz	0.780	0.820	V Sine
10VAC @ 10kHz	0.8V @ .10Hz	0.780	0.820	V Sine
100VAC @ 60Hz	100V @ 60Hz	98.492	101.508	V Sine
100VAC @ 400Hz	120V @ 400Hz	118.192	121.808	V Sine
100VAC @ 5kHz	240V @ 5kHz	236.320	243.680	V Sine Spark
750VAC @ 60Hz	750V @ 60Hz	738.760	761.330	V Sine Spark
0VDC	0V	-0.600	0.600	V
1VDC	900 -mV	897.150	902.850	-mV
1VDC	900 +mV	897.150	902.850	+mV
10VDC	35V	34.883	35.118	+V
100VDC	45V	44.858	45.143	+V Spark
100VDC	500V	498.450	501.550	+V Spark
1000VDC	1kV	0.993	1.007	+kV Spark
SHORT	0Ω	-0.001	0.001	Ω
1kΩ	1kΩ	0.994	1.006	kΩ
10kΩ	10kΩ	9.940	10.060	kΩ
100kΩ	100kΩ	99.400	100.600	kΩ
1MΩ	1MΩ	0.994	1.006	MΩ
10MΩ	10MΩ	9.830	10.170	MΩ
40MΩ	>20MΩ	use 1% resistor greater thant 20 M ohms tolerance = Rx ± (.015 (Rx) +.02)		
DIODE/CONT	0Ω	-0.001	0.001	+mV
DIODE 1k	1kΩ	0.989	1.011	+V
10ADC	1.9 + A	1.878	1.922	+A
40mADC	35 + mA	34.658	35.343	+mA
10mADC	9 + mA	8.853	9.148	+mA
1mADC	0.9mA	0.885	0.915	+mA
0mADC	short	-0.080	0.080	+mA
10AAC	1.9A @ 60kHz	1.864	1.936	A Sine
40mAAC	35mA @ 1kHz	34.358	35.643	mA Sine
10mAAC	9mA @ 1kHz	8.813	9.188	mA Sine
0mAAC	short	-0.030	0.030	mA Sine

Meter Disassembly

This section provides the qualified service technician with step-by-step instructions for disassembling the multimeter to the appropriate subassembly level. Reassembling the multimeter requires that the steps be followed in the reverse order. Where special instructions or considerations are needed for reassembly, a sub-step is provided. For example, Step 5 explains how to remove the Input Board. Step 5a calls attention to the reconnection of P5 and J5.

1. Remove multimeter from holster.
2. Turn the multimeter off and remove the test probes.
3. Turn the multimeter upside down. Unscrew the four rear screws and remove the rear cover.

Note
The disk shaped beeper (BPRI) is located on the inside rear cover.

4. Disconnect the battery.
5. Remove the Input Board by unscrewing the PCB mounting screw located near the center of the board. Lift the board straight up.
    a. When reinstalling the Input Board insert the board with the component side down. Make sure both pins of connector P5 are inserted into J5 on the Display Board.
6. Grasp the spacer with your fingers and gently wiggle while lifting upward. The spacer provides a physical path for zebra connector Z1 which electrically connects the two boards.
7. If necessary, remove the zebra connector (Z1) by pushing it through one side of the spacer and pulling from the other side.
8. Remove the Display Board by gently lifting upward. If necessary, place your hand over the Display Board and turn over, and tap gently.
    a. When reinstalling the Display Board, insert the board with the component side up.
9. Remove the zebra connectors (Z2 and Z3) and the LCD display by gently prying upward on the right side of the LCD display. Note that the right side of the display features a positioning tab. A corresponding indent is located on the push button switch array.
    a. When the zebra connectors are reinstalled, make sure they are inserted with the black bands facing up.

Elastomer Connectors, Cleaning and Replacement Procedure

If the display segments do not function properly, the elastomer (zebra) connectors may need to be replaced or cleaned. A zebra connector consists of conductive carbon traces sandwiched between two foam pads.

Remove dust from the zebra connectors by dusting with a short bristle camel's hair brush. If grease or fingerprint contamination is suspected, clean the connector with alcohol and allow it to air dry. Do not wipe the connector with a fibrous material since excessive lint can cause a poor connection.

Self-Resetting Fuse (PTC Version)

The 40mA input jack is protected by a self-resetting fuse (positive temperature coefficient resistor). When overloaded, the resistance of the self-resetting fuse increases in value and limits the overload current to a safe level.

Once the overload is removed, the operator should allow five minutes for the fuse to return to its normal value.

To test the self-resetting fuse and the current protection circuitry, set the meter to ohms (Ω) and touch the V-Ω test probe to the 40mA input jack. The meter should read less than 20Ω. If the meter reads 20Ω or greater, replace the self-resetting fuse.

Removal and Replacement of the Self-Resetting Fuse

The following steps describe and replacement of the self-resetting fuse.

1. Remove multimeter from holster.
2. Turn the multimeter off and remove the test probes.
3. Turn the multimeter upside down. Unscrew the four rear screws and remove the rear cover.
4. Disconnect the battery.
5. Remove the Input Board by unscrewing the PCB mounting screw located near the center of the board. Gently lift the board straight up.
6. Refer to engineering drawing 1000-069-00
7. Replace self-resetting fuse with new component.
8. Reinstall Input Board in the case and tighten the board mounting screw.
9. Reconnect the battery.
10. Replace the cover and tighten the four screws.
11. Replace multimeter in holster.

Segment Display Test

To assure that the zebra connectors and the rest of the meter's components have been reassembled correctly, perform the segment display test.

1. With the meter in the "off" position, press and hold the CLEAR push button.
2. With the CLEAR push button held in, turn the meter on. All display segments will light.

Section V Replacement Parts and Schematics

The replacement parts and supplies listed in this section may be ordered from Beckman Industrial, or your local service center. Beckman Industrial requires CASH-IN-ADVANCE to be sent along with your order to the address listed below.

To determine the Beckman Industrial part number and description of the part to be replaced, find the part number on the appropriate illustration. Next, note the illustration figure number or parts index number. Locate the figure number on the parts list and verify the description.

The Beckman Industrial address is:

Beckman Industrial Corp.
3883 Ruffin Road, Suite A
San Diego, CA 92123-1898

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. SC's ARE SPRING CLIP CONNECTORS.
4. GROUND SYMBOLS ARE:

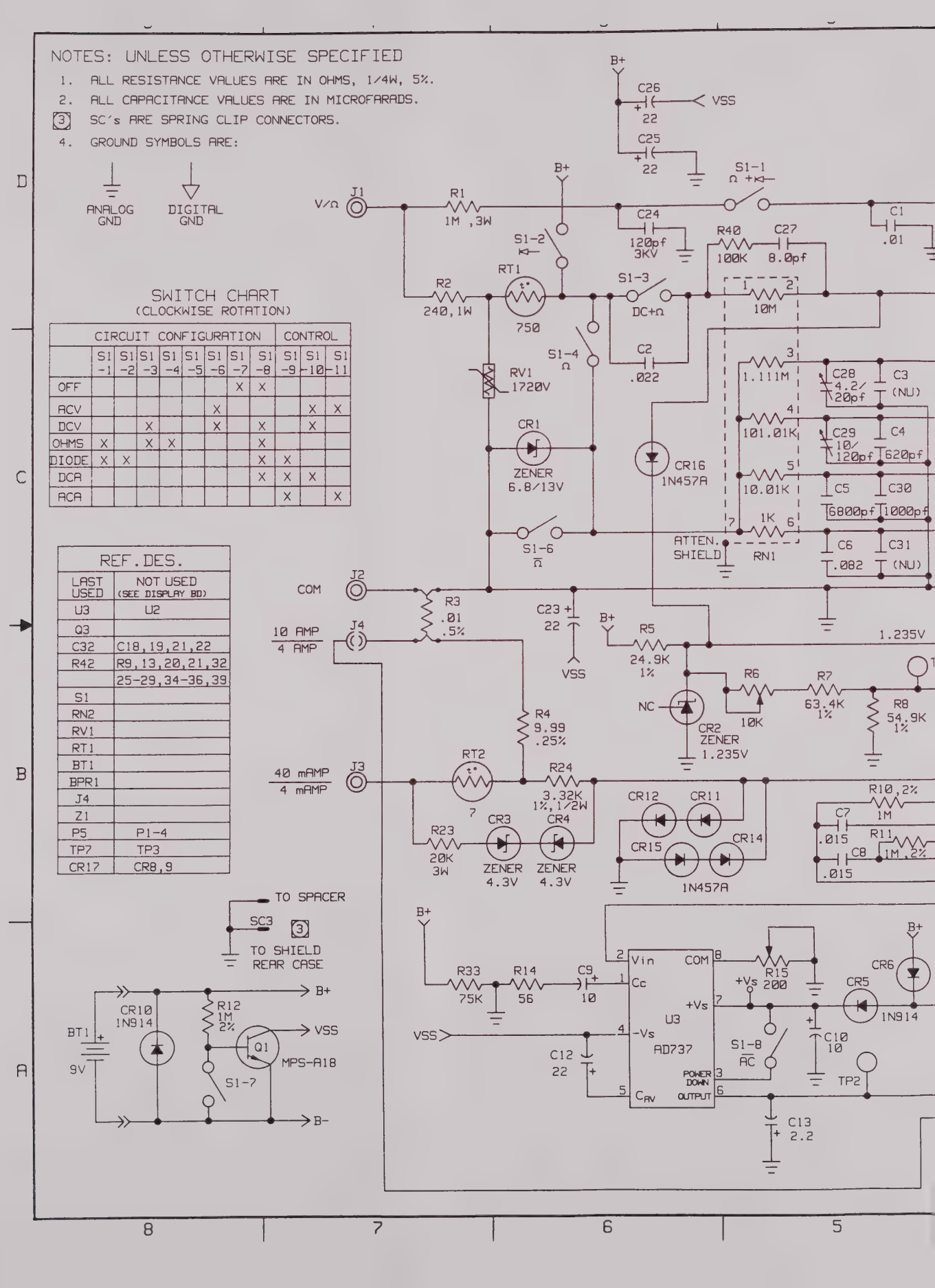
ANALOG GND

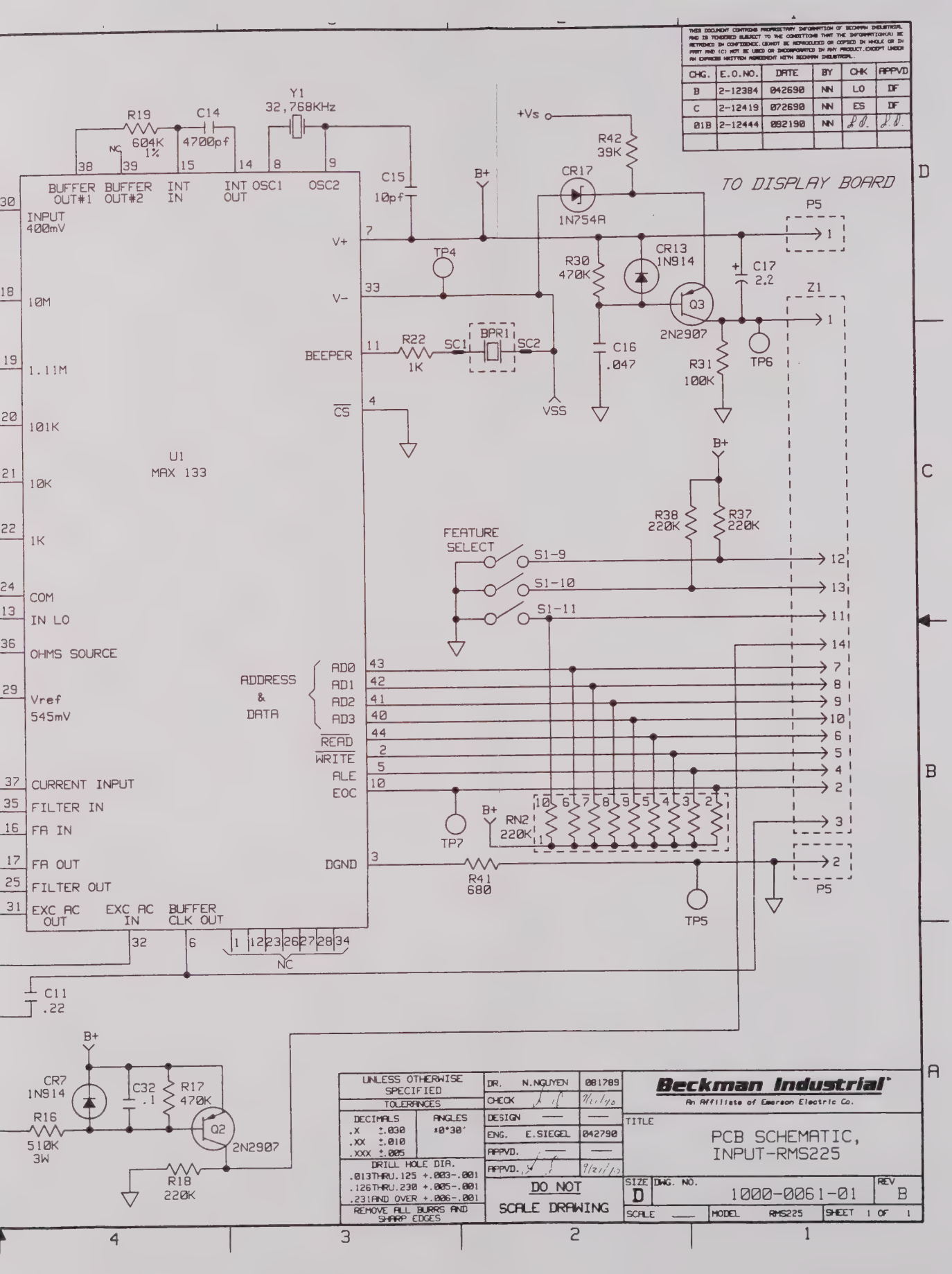
DIGITAL GND

SWITCH CHART
(CLOCKWISE ROTATION)

	CIRCUIT CONFIGURATION								CONTROL		
	S1 -1	S1 -2	S1 -3	S1 -4	S1 -5	S1 -6	S1 -7	S1 -8	S1 -9	S1 -10	S1 -11
OFF							X	X			
ACV						X				X	X
DCV			X			X		X		X	
OHMS	X		X	X				X			
DIODE	X	X						X	X		
DCA								X	X	X	
ACA									X		X

REF. DES.	
LAST USED	NOT USED (SEE DISPLAY BD)
U3	U2
Q3	
C32	C18,19,21,22
R42	R9,13,20,21,32
	25-29,34-36,39
S1	
RN2	
RV1	
RT1	
BT1	
BPR1	
J4	
Z1	
P5	P1-4
TP7	TP3
CR17	CR8,9

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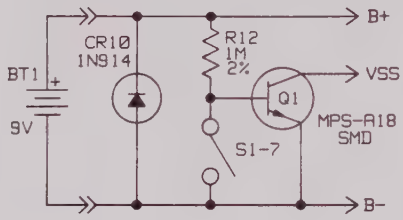
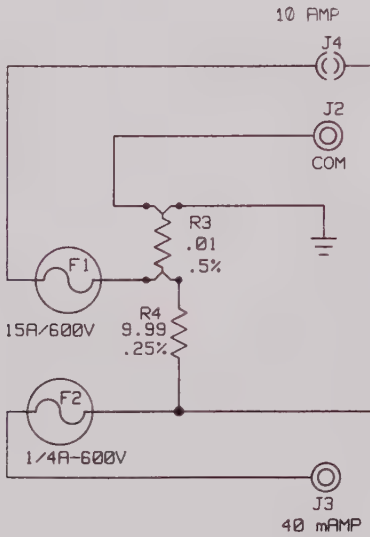
CHG. | E.O.NO. | DATE | BY | CHK | APPVD
B | 2-12384 | 042690 | NN | LO | DF
C | 2-12419 | 072690 | NN | ES | DF
01B | 2-12444 | 092190 | NN | DF | DF
Y1
32,768KHz
R19
604K
1%
C14
4700pf
NC
C15
10pf
+Vs
R42
39K
CR17
1N754A
TO DISPLAY BOARD
P5
CR13
1N914
R30
470K
TP4
C17
2.2
Q3
2N2907
Z1
R22
1K
SC1
BPR1
SC2
C16
.047
VSS
R31
100K
TP6
U1
MAX 133
BUFFER OUT#1
BUFFER OUT#2
INT IN
INT OUT
OSC1
OSC2
INPUT 400mV
10M
1.11M
101K
10K
1K
COM
IN LO
OHMS SOURCE
Vref 545mV
CURRENT INPUT
FILTER IN
FA IN
FA OUT
FILTER OUT
EXC AC OUT
EXC AC IN
BUFFER CLK OUT
V+
V-
BEEPER
CS
ADDRESS & DATA
AD0
AD1
AD2
AD3
READ
WRITE
ALE
EOC
DGND
R38
220K
R37
220K
FEATURE SELECT
S1-9
S1-10
S1-11
RN2
220K
TP7
R41
680
TP5
C11
.22
CR7
1N914
C32
.1
R17
470K
R16
510K
3W
Q2
2N2907
R18
220K
UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS
.X ±.030
.XX ±.010
.XXX ±.005
ANGLES ±0°30'
DRILL HOLE DIA.
.013THRU.125 +.003-.001
.126THRU.230 +.005-.001
.231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES
DR. N.NGUYEN 081789
CHECK
DESIGN
ENG. E.SIEGEL 042790
APPVD.
APPVD.
DO NOT SCALE DRAWING
Beckman Industrial
An Affiliate of Emerson Electric Co.
TITLE
PCB SCHEMATIC, INPUT-RMS225
SIZE D
DWG. NO. 1000-0061-01
REV B
SCALE
MODEL RMS225
SHEET 1 OF 1

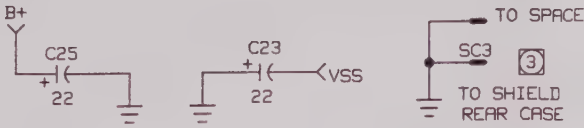
NOTES: UNLESS OTHERWISE SPECIFIED

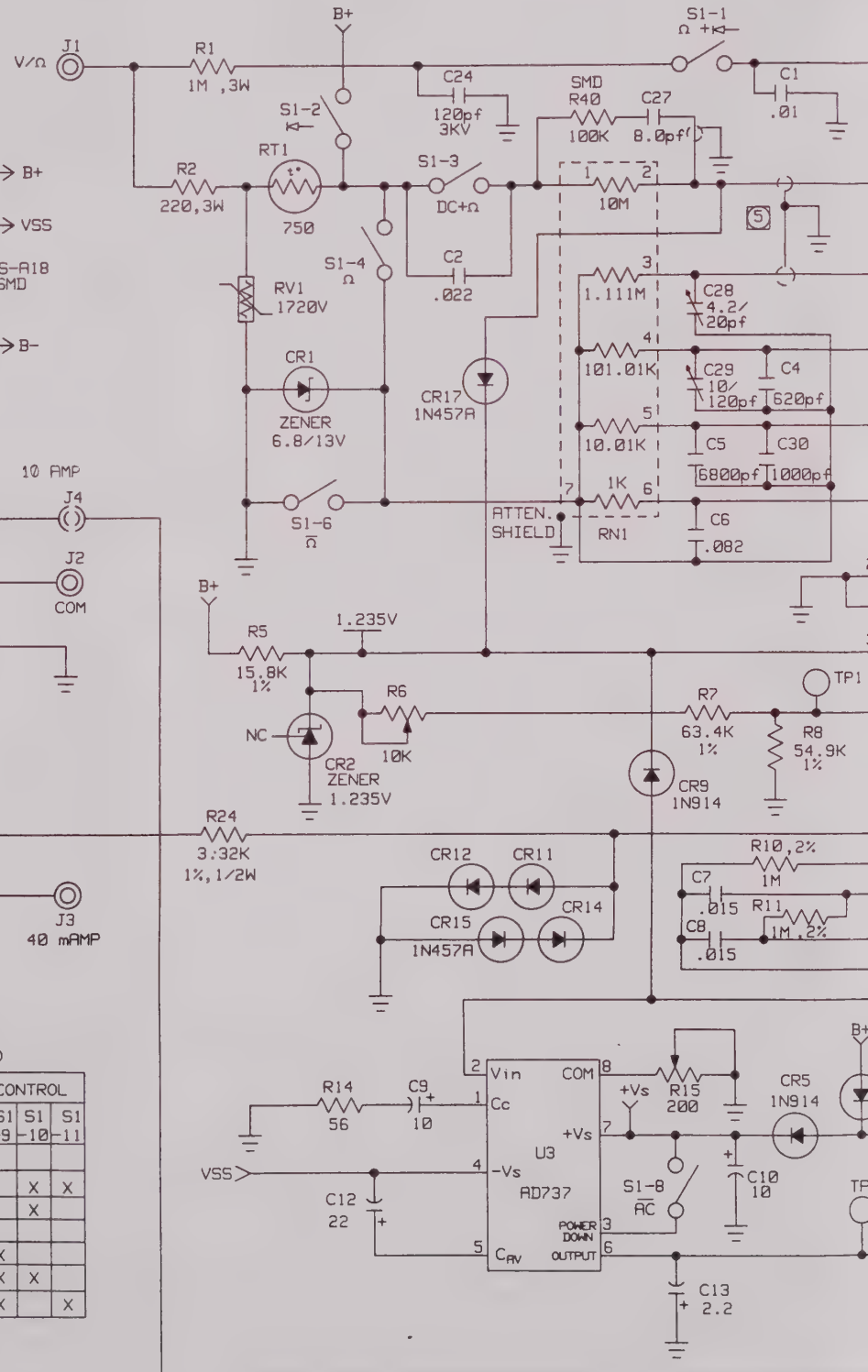
1. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. SC's ARE SPRING CLIP CONNECTORS.
4. COMPONENT PINS SHIELDED: R19-C14
5. SHIELDED TRACES.
6. GROUND SYMBOLS ARE:

ANALOG GND DIGITAL GND



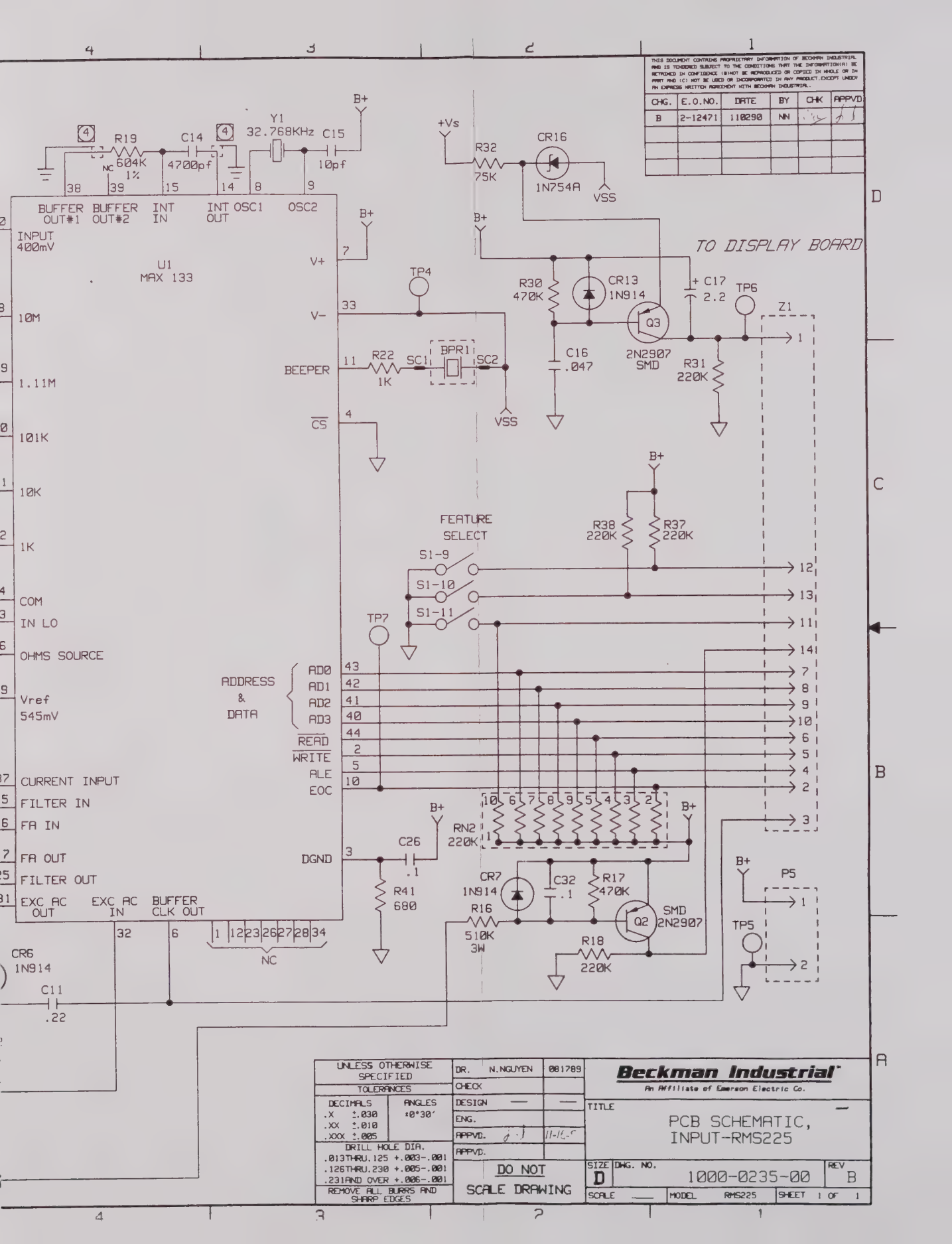






SWITCH CHART
(CLOCKWISE ROTATION)

	CIRCUIT CONFIGURATION								CONTROL		
	S1 -1	S1 -2	S1 -3	S1 -4	S1 -5	S1 -6	S1 -7	S1 -8	S1 -9	S1 -10	S1 -11
OFF							X	X			
ACV						X				X	X
DCV			X			X		X		X	
OHMS	X		X	X				X			
DIODE	X	X						X	X		
DCA								X	X	X	
ACA									X		X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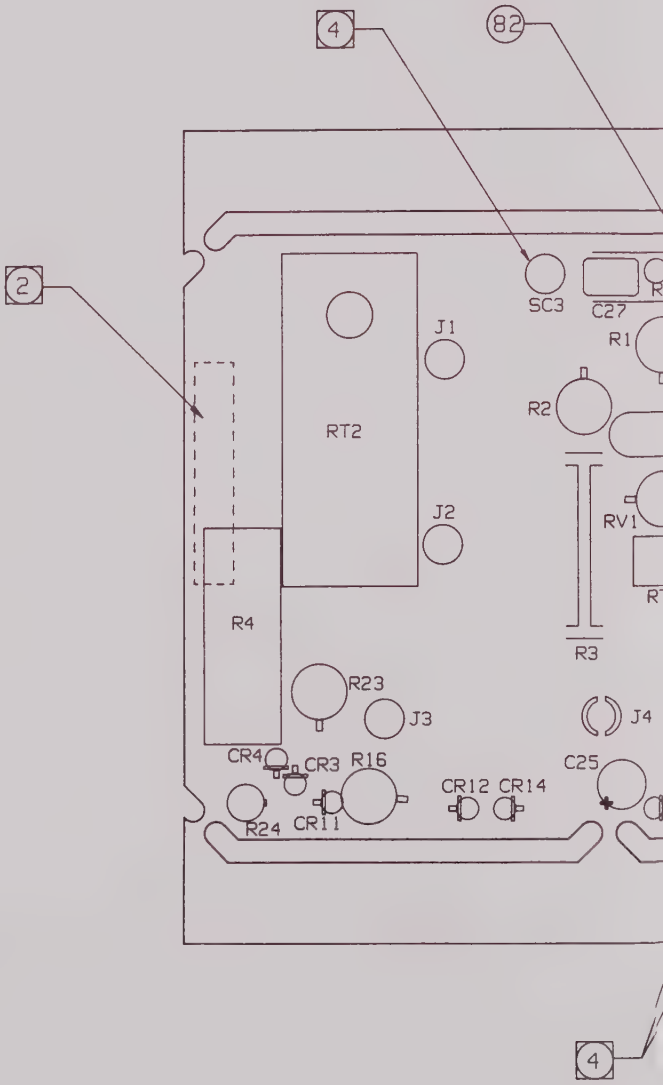
CHG. E.O.NO. DATE BY CHK APPVD
B 2-12471 110290 NN
B+
+Vs
Y1 32.768KHz
C15 10pf
C14 4700pf
R19 604K 1%
NC
R32 75K
CR16 1N754A
VSS
TO DISPLAY BOARD
U1 MAX 133
BUFFER OUT#1
BUFFER OUT#2
INT IN
INT OUT
OSC1
OSC2
INPUT 400mV
10M
1.11M
101K
10K
1K
COM
IN LO
OHMS SOURCE
Vref 545mV
CURRENT INPUT
FILTER IN
FA IN
FA OUT
FILTER OUT
EXC AC OUT
EXC AC IN
BUFFER CLK OUT
V+
V-
BEEPER
CS
AD0
AD1
AD2
AD3
READ
WRITE
ALE
EOC
DGND
ADDRESS & DATA
NC
TP4
TP5
TP6
TP7
R22 1K
BPR1
SC1
SC2
R30 470K
CR13 1N914
Q3 2N2907 SMD
+ C17 2.2
C16 .047
R31 220K
Z1
FEATURE SELECT
S1-9
S1-10
S1-11
R38 220K
R37 220K
RN2 220K
C26 .1
R41 680
CR7 1N914
C32 .1
R17 470K
R16 510K 3W
Q2 2N2907 SMD
R18 220K
P5
CR6 1N914
C11 .22
UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS .X ±.030 .XX ±.010 .XXX ±.005
ANGLES ±0°30'
DRILL HOLE DIA. .013THRU.125 +.003-.001 .126THRU.230 +.005-.001 .231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES
DR. N.NGUYEN 081789
CHECK
DESIGN
ENG.
APPVD.
APPVD.
DO NOT SCALE DRAWING
Beckman Industrial
An Affiliate of Emerson Electric Co.
TITLE
PCB SCHEMATIC, INPUT-RMS225
SIZE D
DWG. NO. 1000-0235-00
REV B
SCALE
MODEL RMS225
SHEET 1 OF 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. THIS UNIT TO BE ASSEMBLED TO SPEC 000-1003.
2. RUBBER STAMP ASSEMBLY NO. AND REVISION LETTER WITH .12 HIGH BLACK PERMANENT INK CHARACTERS.
3. CORRECT PLACEMENT OF PADS IS TOP, CENTER, BOTH SIDES.
4. INSTALL SPRING CONTACTS, SC1-SC3, FROM SOLDER SIDE AFTER WAVE-SOLDER AND WASH.
5. INSTALL BATTERY CLIP FROM THIS SIDE. RED LEAD TO "+" AND BLACK LEAD TO "-". PLACE A KNOT IN THE BATTERY CLIP LEADS ADJACENT TO THE SOLDERED CONNECTIONS.
6. FOR MATERIAL LIST SEE SHEETS 2-5.
7. R41 & C32 INSTALLED ON CIRCUIT SIDE.
8. TRIM LEADS .030 MAX.



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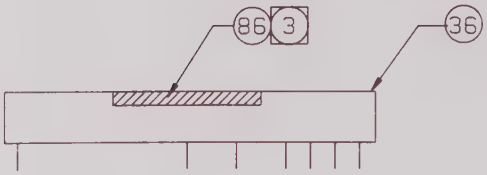
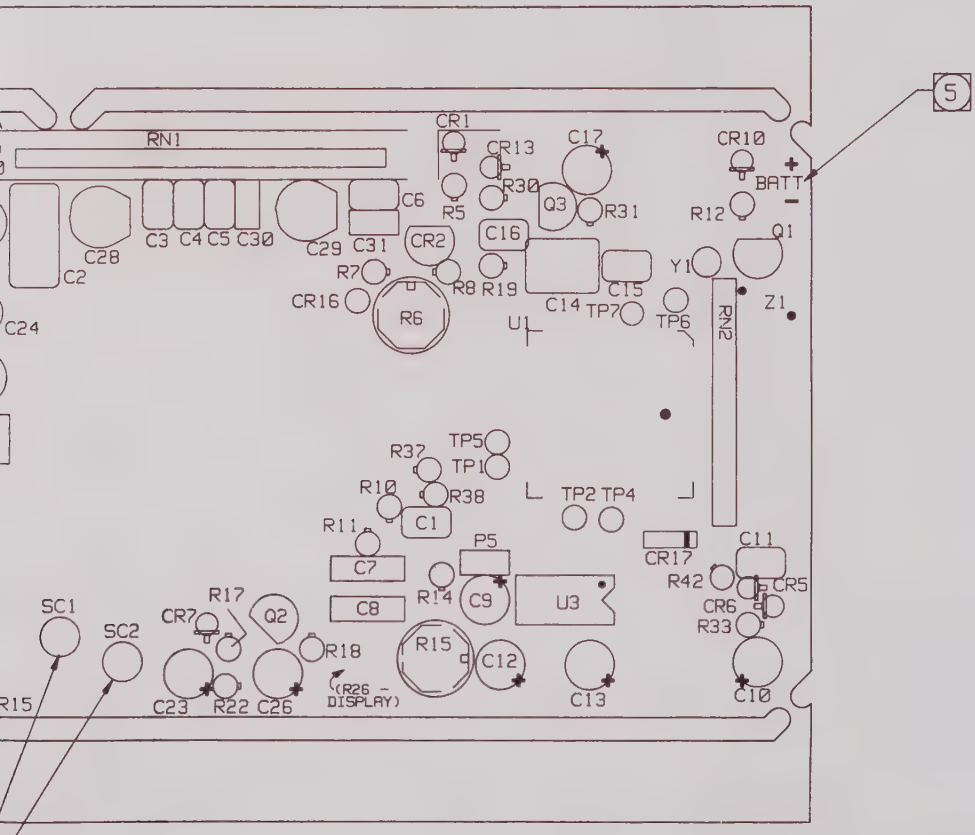
CHG.	E.O.NO.	DATE	BY	CHK	APPVD
01B	2-12444	092190	NN		





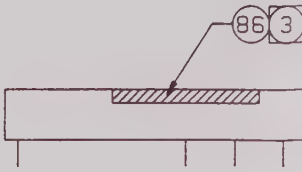
UNLESS OTHERWISE SPECIFIED	DR. N.NGUYEN	092190	Beckman Industrial An Affiliate of Emerson Electric Co.
TOLERANCES	CHECK		
DECIMALS: .X ±.030, .XX ±.010, .XXX ±.005 — ANGLES ±0°30'	DESIGN —	—	TITLE: PCB ASSEMBLY, INPUT- RMS225
	ENG.		
	APPVD. —	—	
DRILL HOLE DIA. .013THRU.125 +.003-.001, .126THRU.230 +.005-.001, .231AND OVER +.006-.001	APPVD.		SIZE D — DWG. NO. 1000-0060-01 — REV B
REMOVE ALL BURRS AND SHARP EDGES	DO NOT SCALE DRAWING		SCALE 2X — MODEL RMS225 — SHEET 1 OF 5

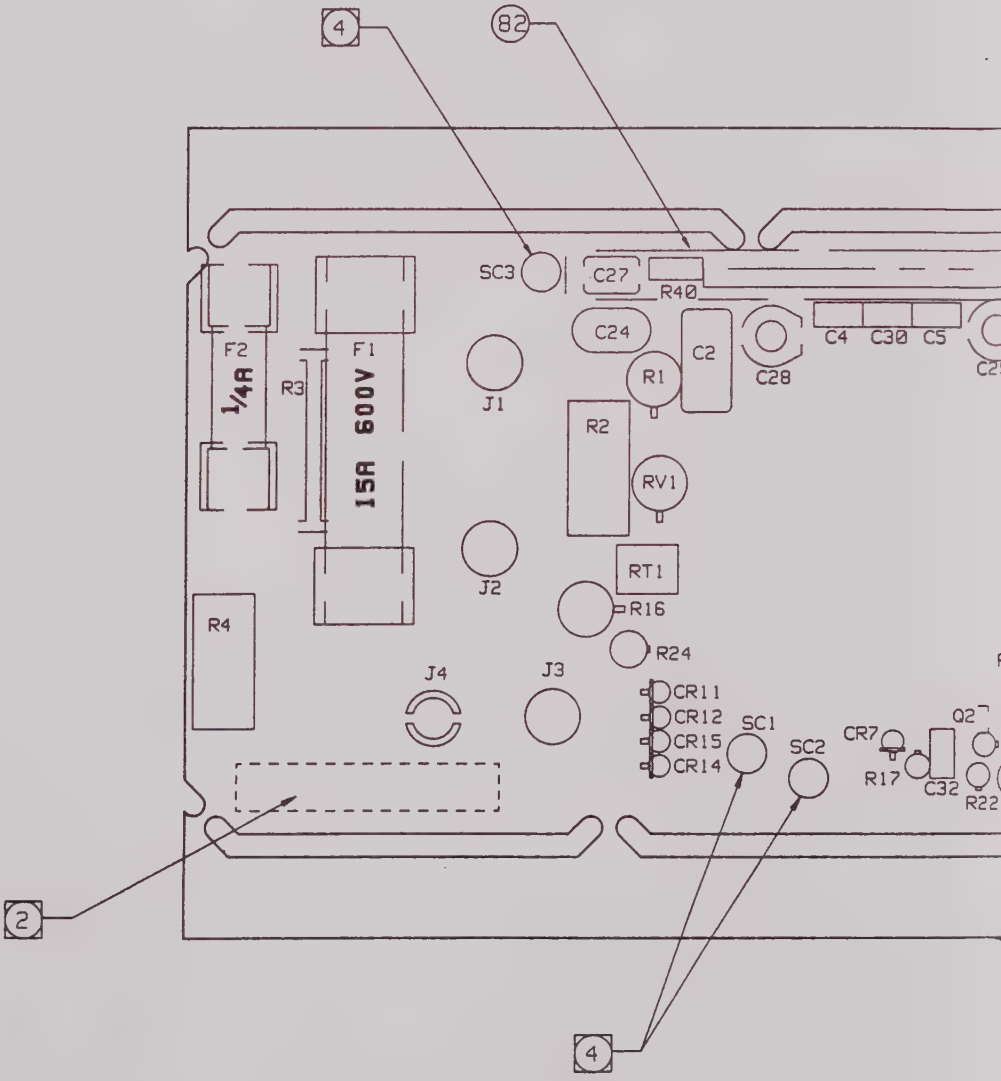
D C B A

4 3 2 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. THIS UNIT TO BE ASSEMBLED TO SPEC 000-1003.
2. RUBBER STAMP ASSEMBLY NO. AND REVISION LETTER WITH .12 HIGH BLACK PERMANENT INK CHARACTERS.
3. CORRECT PLACEMENT OF PADS IS TOP, CENTER, BOTH SIDES.
4. INSTALL SPRING CONTACTS, SC1-SC3, FROM SOLDER SIDE AFTER WAVE-SOLDER AND WASH.
5. INSTALL BATTERY CLIP (ITEM 81) FROM THIS SIDE. RED LEAD TO "+" AND BLACK LEAD TO "-". SLIP SHRINK TUBING (ITEM 80) OVER RED LEAD BEFORE INSTALLING ONTO BOARD.
6. FOR MATERIAL LIST SEE SHEETS 2-5.
7. TRIM LEADS .030 MAX.





8 7 6 5

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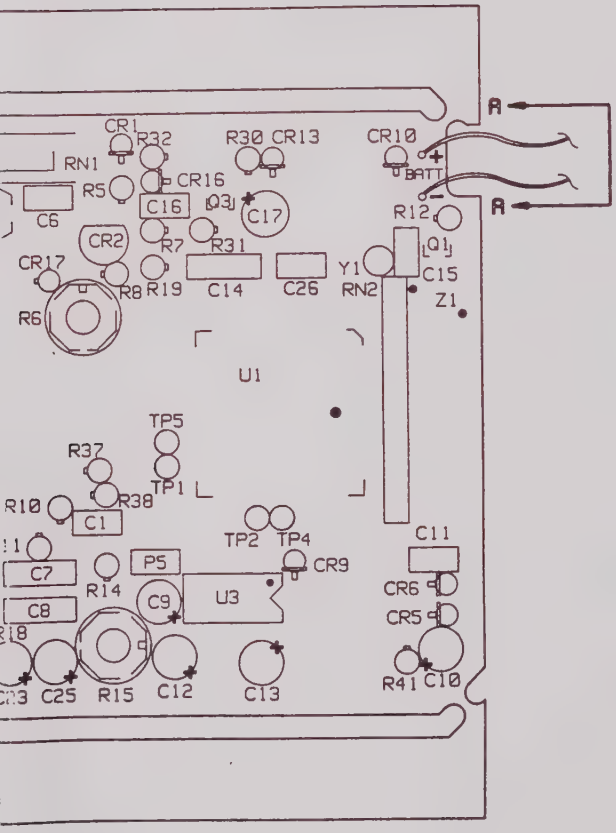
CHG.	E.O.NO.	DATE	BY	CHK	APPVD
B	2-12471	110590	NN	JO	
C	2-12515	1-30-91	- S		

36

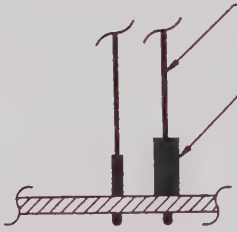


5 81

RED WIRE

80

SHRINK TUBING POSITION APPROXIMATELY AS SHOWN



VIEW A-A

UNLESS OTHERWISE SPECIFIED	DR. N.NGUYEN	103090	Beckman Industrial An Affiliate of Emerson Electric Co.
TOLERANCES	CHECK J. Stoddard	11/16/90	
DECIMALS .X ±.030 .XX ±.010 .XXX ±.005 ANGLES ±0°30'	DESIGN		TITLE: PCB ASSEMBLY, INPUT- RMS225
	ENG.		
DRILL HOLE DIA. .013THRU.125 +.003-.001 .126THRU.230 +.005-.001 .231AND OVER +.006-.001	APPVD.		
REMOVE ALL BURRS AND SHARP EDGES	APPVD.	11/16/90	SIZE D · DWG. NO. 1000-0232-00 · REV C
DO NOT SCALE DRAWING			SCALE 2X · MODEL RMS225 · SHEET 1 OF 5

4 3 2 1

NOTES: UNLESS OTHERWISE SPECIFIED

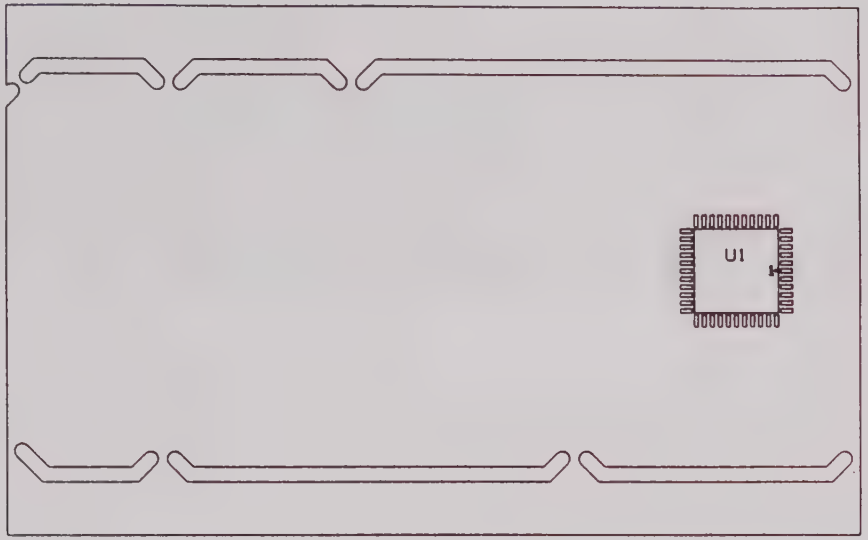
1. ASSEMBLY REQUIREMENTS

   A. THE CHIPS ARE EXTREMELY SENSITIVE TO ELECTROSTATIC DISSIPATION. MAXIMUM E S D CONTROLS ARE REQUIRED DURING ASSEMBLY.

   B. BOARD ASSEMBLIES ARE REQUIRED TO BE PLACED INTO OHM-SHIELD, SHIELDING BAGS, AFTER ASSEMBLY AND DURING SHIPMENT.

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BECKMAN INDUSTRIAL AND IS TENDERED SUBJECT TO THE CONDITIONS THAT THE INFORMATION AS RETAINED IN CONFIDENCE, IT MAY BE REPRODUCED OR COPIED IN WHOLE OR IN PART AND (C) MAY BE USED OR DISCLOSED IN ANY PROJECT EXCEPT UNDER AN EXPRESS WRITTEN AGREEMENT WITH BECKMAN INDUSTRIAL.

CHG.	E.O.NO.	DATE	BY	CHK	APPVD
X1	R & D	121589	NN	LO	—
B	2-12384	042690	NN		



ITEM	REF. DES.	PART NO.	DESCRIPTION	QTY
2	U1	S965-6600-08	IC, SMT, A/D CONV, 3-3/4 DIGIT	1
1	—	1000-0059-00	PCB, INPUT - RMS225	1

UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS .X ±.030 .XX ±.010 .XXX ±.005
ANGLES ±0°30'
DRILL HOLE DIA.
.013THRU.125 +.003-.001
.126THRU.230 +.005-.001
.231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES

DR. N-NGUYEN 121589
CHECK 4/27/90
DESIGN
ENG.
APPVD.
APPVD.

DO NOT SCALE DRAWING

Beckman Industrial
An Affiliate of Emerson Electric Co.

TITLE
PCB ASSY, SMT, INPUT, 4 JACK

SIZE C | DWG. NO. 1000-0140-00 | REV B
SCALE 2X | MODEL RMS225 | SHEET 1 OF 1

L D	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM
3	0001	1000-0064-01	SCH. PCB, DISPLAY RMS225	1000-0064-01	B	.000	EA
3	0002	1000-0141-01	PCB ASSY., SMT DISPLAY RMS225	1000-0141-01	B	1.000	EA
8	0004	942-201-34	RES. CARBON 100K, 1/4W,5%	ISM		7.000	EA
6	0014	973-3700-27	CONN,2 PIN FEMALE			1.000	EA
4	0016	3000-110-201	CAP .1U/80,20%	3000-11X-2XX	A	3.000	EA
6	0017	3000-150-107	CAP,22UF,TANT.DIPPED	3000-15X-10X	F	1.000	EA

L D	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM TY
3	0001	1000-0235-00	PCB SCH., INPUT - RMS225	1000-0235-00	J	.000	EA
3	0002	1000-0234-00	PCB ASSY,SMT,INPUT 4 JACK RMS	1000-0234-00	C	1.000	EA
3	0004	3000-40-102	SHUNT,RES .01 .5%	3000-040-102	A	1.000	EA
4	0005	3000-70-106	RES 9.99 3W .25% WW	3000-07X-106	A	1.000	EA
5	0006	942-205-60	RES, 1/4W +5% 56	ISM		1.000	EA
3	0007	952-3000-00	RES, METOX,PWR,FLMPRF,220,5%3W			1.000	EA
7	0008	942-201-02	RES, CARBON, 1K 1/4W 5%	ISM		1.000	EA
8	0009	3000-50-133	RES,MTL FLM,3.32KOHM	3000-05X-1XA	E	1.000	EA
3	0012	924-4158-02	RES, 15.8K	ISM		1.000	EA
5	0014	924-4549-02	RES, RN55C 1/4W 54.9K	ISM		1.000	EA
3	0015	924-4634-02	RES, MF RN55C 1/4W, 1% 63.4K	ISM		1.000	EA
3	0016	942-207-53	RES, CARBON, 75K, 1/4W 5%	ISM		1.000	EA
3	0017	942-2068-01	RES, CARBON FILM 1/8W, 5%	ISM		1.000	EA
3	0019	924-4604-03	RES, 604K	ISM		1.000	EA
7	0021	942-202-24	RES, 1/4W 5% 220K	ISM		1.000	EA
1	0023	3000-50-130	RES 510K OHM 3W M.F.	ISM		4.000	EA
7	0024	942-204-74	RES, CARBON, 1/4W, 5%, 470K	3000-05X-1XX	N	1.000	EA
	0025	3000-050-120	RES, METAL FILM 3W, 5% 1M	ISM		2.000	EA
	0026	3000-50-599	RES 1M 2% .125W MX3	3000-05X-1XX	N	1.000	EA
	0028	960-012-01	POT,1-TURN,BOT ADJ .1W 10% 200	3000-05X-XXX	T	3.000	EA
	0029	3000-90-132	POT 10K BOTTOM ADJ	ISM		1.000	EA
	0031	3000-80-103	PTC 750 OHM	3000-090-13X	B	1.000	EA
	0034	3000-60-102	MOV 1720V	3000-08X-103	K	1.000	EA
	0036	951-0100-05	RN 7PIN-5RES SIP,1200V .25%10M	3000-08X-102	K	1.000	EA
	0037	950-0220-02	RES NTWK 10SIP 220K 2%	ISM		1.000	EA
	0038	3000-110-212	CAP 1000P/10% MONO	ISM		1.000	EA
				3000-11X-2XX	A	1.000	EA

NOTES: UNLESS OTHERWISE SPECIFIED

1. ASSEMBLY REQUIREMENTS

   A. THE CHIPS ARE EXTREMELY SENSITIVE TO ELECTROSTATIC DISSIPATION. MAXIMUM E S D CONTROLS ARE REQUIRED DURING ASSEMBLY.

   B. BOARD ASSEMBLIES ARE REQUIRED TO BE PLACED INTO OHM-SHIELD, SHIELDING BAGS, AFTER ASSEMBLY AND DURING SHIPMENT.

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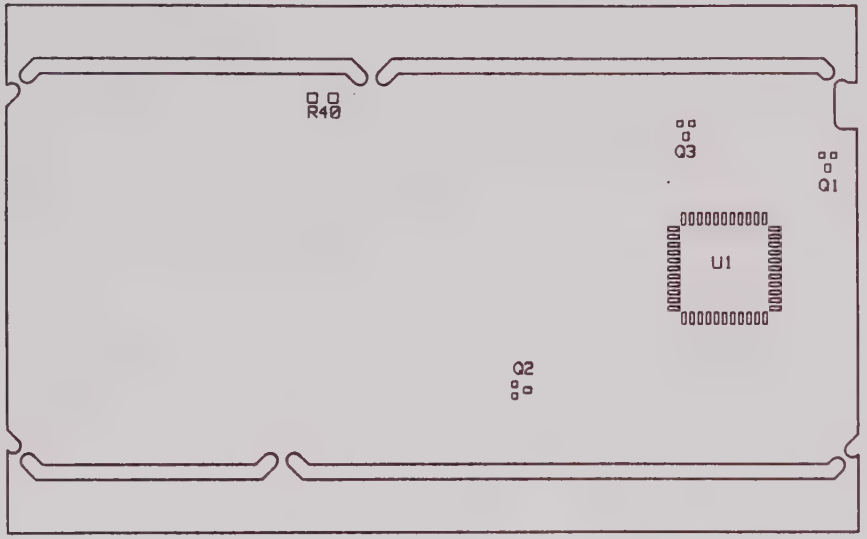
CHG.	E.O.NO.	DATE	BY	CHK	APPVD
B	2-12471	110590	NN		



ITEM	REF.DES.	PART NO.	DESCRIPTION	QTY
5	R40	S922-4100-03	RES, SMT, 1/8W 5%, 100K	1
4	Q2-3	S962-290-71	XSTR PNP, SMT, 2N2907	2
3	Q1	S964-0400-18	XSTR NPN, SMT, MPS-A18	1
2	U1	S965-6600-08	IC, SMT, A/D CONV, 3-3/4 DIGIT	1
1	—	1000-0233-00	PCB, INPUT - RMS225	1

UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS: .X ±.030, .XX ±.010, .XXX ±.005
ANGLES: ±0°30'
DRILL HOLE DIA.
.013THRU.125 +.003-.001
.126THRU.238 +.005-.001
.231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES

DO NOT SCALE DRAWING

DR.	N-NGUYEN	092690
CHECK	J. Offerdahl	11/14/90
DESIGN		
ENG.		
APPVD.		
APPVD.		11/3/90

Beckman Industrial
An Affiliate of Emerson Electric Co.

TITLE: PCB ASSY, SMT, INPUT, 4 JACK

SIZE C | DWG. NO. 1000-0234-00 | REV B

SCALE 2X | MODEL RMS225 | SHEET 1 OF 1

29

DRAWING TITLE	MODEL NO.	DATE	SHEET
PCB ASSY, INPUT - RMS225 (IGA VERSION)	RMS225	08/05/91	2 of 5

ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS
1	Schematic, Input Board - RMS225	1000-0225-00	0	
2	PCB ASSY, SMT, INPUT RMS225	1000-0234-00	1	
3				
4	RES, SHUNT .5%, .01 Ohm	3000-040-102	1	R3
5	RES, WIREWOUND 3W .25%, 9.99 Ohm	3000-070-106	1	R4
6	Res, Carbon 1/4W, 5%, 56	942-205-60	1	R14
7	RES, FLAMEPROOF, 3W, 5%, 220 OHM	952-0000-00	1	R2
8	RES, CARBON 1/4W, 5%, 1K	942-201-02	1	R22
9	RES, METAL FILM 1/2W 1%, 3.32K	3000-050-133	1	R24
10				
11				
12	RES, MF RN55C 1/4W, 1%, 15.8K	924-4158-02	1	R5
13				
14	RES, MF RN55C 1/4W, 1%, 54.9K	924-4549-02	1	R8
15	RES, MF RN55C 1/4W, 1%, 63.4K	924-4634-02	1	R7
16	RES, CARBON 1/4W, 5%, 75K	942-207-53	1	R32
17	RES. CARBON 1/8W 5%, 680	942-206B-01	1	R41
18				
19	RES, MF RN55C 1/4W, 1%, 604K	924-4604-03	1	R19
20				
21	RES, CARBON 1/4W, 5%, 220K	942-202-24	4	R18,R31,R37-38
22				
23	RES, METAL FILM 3W 5%, 510K	3000-050-130	1	R16
24	RES, CARBON 1/4W, 5%, 470K	942-204-74	2	R17,38
25	RES, METAL FILM 3W, 5%, 1M	3000-050-120	1	R1

DRAWING TITLE		MODEL NO.		DATE	SHEET
PCB ASSY, INPUT - RMS225 (10A VERSION)		RMS225		08/05/91	3 of 5
ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS	
26	RES, METAL FILM 1/8W 2%, 1M	3000-050-599	3	R10-12	
27					
28	POT, 1-TURN BOT ADJ, .1W, 10%, 200	960-012-01	1	R15	
29	POT, TRIMMER, 6mm, 10K	3000-090-132	1	R6	
30					
31	RES, POS. T.C	3000-080-103	1	RT1	
32					
33					
34	VARISTOR, METAL OXIDE 10% VERT, 1720V	3000-000-102	1	RV1	
35					
36	RES NTWK, DECADE VOLTAGE DIVIDER	951-0100-05	1	RN1	
37	RES NTWK, 10 SIP, 220K	950-0220-02	1	RN2	
38	CAP, MONOLITHIC RADIAL, .001uf	3000-110-212	1	C38	
39	CAP, MONO RADIAL, X7R, 5%, .082uf	901-0168-04	1	C6	
40	CAP, MONOLITHIC RADIAL, .1 uf +80%-20%	3000-110-201	2	C26,C32	
41	CAP, MONOLITHIC, RADIAL, NPO, 10%, 10PF	3000-110-203	1	C15	
42	CAP, MONO RADIAL, NPO, 5%, 620pf	901-0169-00	1	C4	
43	CAP, MONO RADIAL, X7R, 5%, 6800pf	901-0168-03	1	C5	
44	CAP, CERAMIC DISC HIGH VOLTAGE, 150pF	3000-140-100	1	C24	
45	CAP, MET PPROP, RADIAL, 63VDC, 10%, .0047UF	917-0047-10	1	C14	
46	CAP, MONOLITHIC RADIAL, .01	3000-110-215	2	C1,C33	
47	CAP, MET POLYESTER 100V, .015uF	3000-130-114	2	C7,8	
48	CAP, CERAMIC, 1.5KV +/-.1pf, 8.0pf	906-0002-00	1	C27	
49	CAP, MET POLYESTER 400V, .022uF	3000-130-117	1	C2	
50	CAP, CER, X7R, 10%, .047UF	3000-110-219	1	C16	

DRAWING TITLE	MODEL NO.	DATE	SHEET
PCB ASSY, INPUT - RMS225 (10A VERSION)	RMS225	08/05/91	4 of 5

ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS
51	CAP, MONOLITHIC RADIAL, .22uF	3000-110-290	1	C11
52	CAP, VAR. 4.2-20P	903-204-00	1	C28
53	CAP, TANT, 10V, 2.2 uf	3000-150-106	2	C13,17
54	CAP, TANT DIP 10V, 10.0uF	3000-150-101	1	C9
55	CAP, TANT, 10V, 22uf	3000-150-107	4	C10,C12,C22,C25
56	CAP, TRIMMING, 10-120 pf	914-1000-00	1	C29
57				
58	DIODE, 1N457A	961-045-70	4	CR11,12,14,15
59	DIODE, 1N914	961-091-40	5	CR5-7,10,13
60	DIODE, ZENER, LOW LEAKAGE, 6.8/13V	3000-230-101	1	CR1
61	DIODE, REF, 1.235V	3000-230-102	1	CR2
62	DIODE, 6.8V ZENER, 1N754A	961-075-41	1	CR16
63				
64	TRANSISTOR, PNP 2N4258	962-425-00	1	CR17 (COLLECTOR-BASE USED AS A DIODE)
65				
66				
67				
68				
69	IC, RMS CONV, AD737	3000-270-132	1	U3
70				
71				
72	Spring Contact, Beeper/Shield	3000-370-352	3	SC1-3
73				
74				
75	XTAL, 32.768KHz	967-005-23	1	Y1

DRAWING TITLE	MODEL NO.	DATE	SHEET
PCB ASSY, INPUT - RMS225 (10A VERSION)	RMS225	08/05/91	5 of 5

ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS
76				
77	Receptacle, Female	3000-371-289	3	J1-3
78	Input Contact, 10AMP	3000-371-266	2	J4
79	Poly Tube, 10A Jack	3000-450-215	1	
80				
81	CONN, MOLDED, 9V BATTERY	1000-0325-00	1	
82	Shield, Attenuator	3000-450-212	1	
83	CONN, HEADER, MALE, 2 PIN	973-3700-73	1	P5
84	Fuse, Clip, 13/32"	3000-370-409	2	(F1)
85	Fuse, 15AMP/600V, High Energy	3000-400-214	1	F1
86	FUSE, 1/4A 600V	3000-400-121	1	F2
87	Fuse, Clip, 1/4" (Earless)	3000-370-287	2	(F2)
88	Pad, Attenuator	3000-450-248	2	
89				
90				

LL CD	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM
02	0001	1000-0350-00	REAR CASE, MX3	1000-0350-00	B	1.000	EA
02	0002	3000-426-391	CASE,FRONT,223	3000-32X-3X1	C	1.000	EA
02	0003	1000-0232-00	PCB ASSY, INPUT - RMS225	1000-0232-00	B	1.000	EA
02	0004	1000-0063-01	PCB ASSEMBLY, DISPLAY RMS225	1000-0063-01	B	1.000	EA
02	0005	3000-570-156	ROTOR ASSY	3000-570-156	A	1.000	EA
02	0006	1000-0077-00	PUSH BUTTON ARRAY/BEZEL 3 BUTN	1000-007X-00	B	1.000	EA
02	0008	1000-0311-00	SPACER, NON-CONDUCTIVE	1000-0311-00	B	1.000	EA
02	0009	1000-0075-00	KNOB, 7 POSITION RMS225	1000-0075-00	B	1.000	EA
02	0010	1000-0071-01	OVERLAY, FRONT PANEL, RMS225	1000-0071-01	B	1.000	EA
02	0011	3000-450-211	SHIELD,CASE REAR	3000-450-211	A	1.000	EA
02	0012	3000-450-222	O-RING,KNB/JCK .345	3000-450-22X	A	1.000	EA
03	0013	3000-450-244	PAD,ANTI-SKID	3000-450-244	A	2.000	EA
02	0014	1000-0045-00	LCD, 4 DIGIT	1000-0045-00	B	1.000	EA
02	0015	1000-0078-00	CONNECTOR CARBON LCD ZEBRA	1000-0078-00	B	2.000	EA
02	0016	3000-370-351	ZEBRA INTERCONNECT	3000-370-351	A	1.000	EA
04	0017	3000-380-100	BATTERY MX	3000-380-100	C	1.000	EA
03	0018	3000-451-182	PAD,BATTERY CONN. HD	3000-45X-182	A	1.000	EA
02	0019	3000-360-107	BEEPER MX3	3000-360-107	B	1.000	EA
02	0021	1000-0069-00	PICTORIAL, 22X	1000-0069-00	D	.000	EA
02	0022	1000-0152-00	LENS PROTECTOR	1000-0152-00	B	1.000	EA
04	0023	3000-450-106	SCREW 4-24 3/8"	3000-450-106	K	1.000	EA
02	0024	3000-450-247	SCREW 4-40 7/8"	3000-450-300	H	4.000	EA
02	0025	1000-0169-00	HOLSTER - 200 SERIES	1000-0169-00	C	1.000	EA
02	0026	1000-0170-00	BAIL - 200 SERIES - HOLSTER	1000-0170-00	B	1.000	EA
02	0027	1000-0174-00	WRIST STRAP-HOLSTER ASSY.	1000-0174-00	B	1.000	EA
03	0028	3000-370-282	STD.TEST LD.MX2,MX3	3000-370-282	A	1.000	EA
02	0032	1000-0073-01	OPERATOR'S MANUAL RMS225	1000-0073-01	B	1.000	EA
02	0033	1000-0175-01	CARTON, 200 SERIES + HOLSTER	1000-0175-01	B	1.000	EA
03	0034	3000-940-164	CARD,INST.REP.& SERV	3000-940-164	C	1.000	EA
02	0035	3000-450-252	SHIELD FT CASE MX3	3000-450-252	A	1.000	EA
02	0038	1000-0041-00	PRODUCT SPECIFICATION RMS225	1000-0041-00	C	.000	EA
02	0039	3000-420-358	SPARE FUSE HOLDER	3000-420-358	A	1.000	EA
03	0040	3000-400-121	FUSE .25A/600V HDMX3	3000-400-121	A	1.000	EA

LL CD	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM
02	0001	1000-0350-00	REAR CASE, MX3	1000-0350-00	B	1.000	EA
02	0002	3000-426-391	CASE,FRONT,223	3000-32X-3X1	C	1.000	EA
02	0003	1000-0232-00	PCB ASSY, INPUT - RMS225	1000-0232-00	B	1.000	EA
02	0004	1000-0063-01	PCB ASSEMBLY, DISPLAY RMS225	1000-0063-01	B	1.000	EA
02	0005	3000-570-156	ROTOR ASSY	3000-570-156	A	1.000	EA
02	0006	1000-0077-00	PUSH BUTTON ARRAY/BEZEL 3 BUTN	1000-007X-00	B	1.000	EA
02	0008	1000-0311-00	SPACER, NON-CONDUCTIVE	1000-0311-00	B	1.000	EA
02	0009	1000-0075-00	KNOB, 7 POSITION RMS225	1000-0075-00	B	1.000	EA
02	0010	1000-0071-01	OVERLAY, FRONT PANEL, RMS225	1000-0071-01	B	1.000	EA
02	0011	3000-450-211	SHIELD,CASE REAR	3000-450-211	A	1.000	EA
02	0012	3000-450-222	O-RING,KNB/JCK .345	3000-450-22X	A	1.000	EA
03	0013	3000-450-244	PAD,ANTI-SKID	3000-450-244	A	2.000	EA
02	0014	1000-0045-00	LCD, 4 DIGIT	1000-0045-00	B	1.000	EA
02	0015	1000-0078-00	CONNECTOR CARBON LCD ZEBRA	1000-0078-00	B	2.000	EA
02	0016	3000-370-351	ZEBRA INTERCONNECT	3000-370-351	A	1.000	EA
04	0017	3000-380-100	BATTERY MX	3000-380-100	C	1.000	EA
03	0018	3000-451-182	PAD,BATTERY CONN. HD	3000-45X-182	A	1.000	EA
02	0019	3000-360-107	BEEPER MX3	3000-360-107	B	1.000	EA
02	0021	1000-0069-00	PICTORIAL, 22X	1000-0069-00	D	.000	EA
02	0022	1000-0152-00	LENS PROTECTOR	1000-0152-00	B	1.000	EA
04	0023	3000-450-106	SCREW 4-24 3/8"	3000-450-106	K	1.000	EA
02	0024	3000-450-247	SCREW 4-40 7/8"	3000-450-300	H	4.000	EA
02	0025	1000-0169-00	HOLSTER - 200 SERIES	1000-0169-00	C	1.000	EA
02	0026	1000-0170-00	BAIL - 200 SERIES - HOLSTER	1000-0170-00	B	1.000	EA
02	0027	1000-0174-00	WRIST STRAP-HOLSTER ASSY.	1000-0174-00	B	1.000	EA
03	0028	3000-370-282	STD.TEST LD.MX2,MX3	3000-370-282	A	1.000	EA
02	0032	1000-0073-01	OPERATOR'S MANUAL RMS225	1000-0073-01	B	1.000	EA
02	0033	1000-0175-01	CARTON, 200 SERIES + HOLSTER	1000-0175-01	B	1.000	EA
03	0034	3000-940-164	CARD,INST.REP.& SERV	3000-940-164	C	1.000	EA
02	0035	3000-450-252	SHIELD FT CASE MX3	3000-450-252	A	1.000	EA
02	0038	1000-0041-00	PRODUCT SPECIFICATION RMS225	1000-0041-00	C	.000	EA
02	0039	3000-420-358	SPARE FUSE HOLDER	3000-420-358	A	1.000	EA
03	0040	3000-400-121	FUSE .25A/600V HDMX3	3000-400-121	A	1.000	EA

LL CD	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM
03	0001	1000-0064-01	SCH. PCB, DISPLAY RMS225	1000-0064-01	B	.000	EA
03	0002	1000-0141-01	PCB ASSY., SMT DISPLAY RMS225	1000-0141-01	B	1.000	EA
08	0004	942-201-34	RES. CARBON 100K, 1/4W,5%	ISM		7.000	EA
06	0014	973-3700-27	CONN,2 PIN FEMALE			1.000	EA
04	0016	3000-110-201	CAP .1U/80,20%	3000-11X-2XX	A	3.000	EA
06	0017	3000-150-107	CAP,22UF,TANT.DIPPED	3000-15X-10X	F	1.000	EA

LL CD	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM TY
03	0001	1000-0235-00	PCB SCH., INPUT - RMS225	1000-0235-00	J	.000	EA
03	0002	1000-0234-00	PCB ASSY,SMT,INPUT 4 JACK RMS	1000-0234-00	C	1.000	EA
03	0004	3000-40-102	SHUNT,RES .01 .5%	3000-040-102	A	1.000	EA
04	0005	3000-70-106	RES 9.99 3W .25% WW	3000-07X-106	A	1.000	EA
05	0006	942-205-60	RES, 1/4W +5% 56	ISM		1.000	EA
03	0007	952-0000-00	RES, METOX,PWR,FLMPRF,220,5%3W			1.000	EA
07	0008	942-201-02	RES, CARBON, 1K 1/4W 5%	ISM		1.000	EA
03	0009	3000-50-133	RES,MTL FLM,3.32KOHM	3000-05X-1XA	E	1.000	EA
03	0012	924-4158-02	RES, 15.8K	ISM		1.000	EA
05	0014	924-4549-02	RES, RN55C 1/4W 54.9K	ISM		1.000	EA
03	0015	924-4634-02	RES, MF RN55C 1/4W, 1% 63.4K	ISM		1.000	EA
08	0016	942-207-53	RES, CARBON, 75K, 1/4W 5%	ISM		1.000	EA
03	0017	942-2068-01	RES, CARBON FILM 1/8W, 5%	ISM		1.000	EA
03	0019	924-4604-03	RES, 604K	ISM		1.000	EA
07	0021	942-202-24	RES, 1/4W 5% 220K	ISM		4.000	EA
05	0023	3000-50-130	RES 510K OHM 3W M.F.	3000-05X-1XX	N	1.000	EA
07	0024	942-204-74	RES, CARBON, 1/4W, 5%, 470K	ISM		2.000	EA
03	0025	3000-050-120	RES, METAL FILM 3W, 5% 1M	3000-05X-1XX	N	1.000	EA
04	0026	3000-50-599	RES 1M 2% .125W MX3	3000-05X-XXX	T	3.000	EA
03	0028	960-012-01	POT,1-TURN,BOT ADJ .1W 10% 200	ISM		1.000	EA
03	0029	3000-90-132	POT 10K BOTTOM ADJ	3000-090-13X	B	1.000	EA
08	0031	3000-80-103	PTC 750 OHM	3000-08X-103	K	1.000	EA
08	0034	3000-80-102	MOV 1720V	3000-08X-102	K	1.000	EA
03	0036	951-0100-05	RN 7PIN-5RES SIP,1200V .25%10M	ISM		1.000	EA
05	0037	950-0220-02	RES NTWK 10SIP 220K 2%	ISM		1.000	EA
07	0038	3000-110-212	CAP 1000P/10% MONO	3000-11X-2XX	A	1.000	EA

03	0039	901-0168-04	CAP,.082 UF, MONO RAD. X7R,50V	ISM		1.000	EA
04	0040	3000-110-201	CAP .1U/80,20%	3000-11X-2XX	A	2.000	EA
03	0041	3000-110-203	CAP, MONO, RADIAL 10PF	3000-11X-2XX	A	1.000	EA
03	0042	901-0169-00	CAP,.00062 UF,MONO RAD.NPO 50V	ISM		1.000	EA
03	0043	901-0168-03	CAP,.0068 UF,MONO RAD. X7R 50V	ISM		1.000	EA
03	0044	3000-140-100	CAP 150PF 3KV	3000-14X-100	B	1.000	EA
03	0045	917-0047-10	CAP, PP,RADIAL,63V10% .0047VF	ISM		1.000	EA
04	0046	3000-110-215	CAP .01U/10% MONO	3000-11X-2XX	A	2.000	EA
03	0047	3000-130-114	CAP .015UF METALPOLY	3000-130-1XX	O	2.000	EA
03	0048	906-0002-00	CAP, .0000080 MFD, 1.5KV,COG	ISM		1.000	EA
03	0049	3000-130-117	CAP .022UF METALPOLY	3000-130-1XX	O	1.000	EA
04	0050	3000-110-219	CAP .047U/10% MONO	3000-11X-2XX	A	1.000	EA
04	0051	3000-110-200	CAP .22U/80,20%	3000-11X-2XX	A	1.000	EA
03	0052	903-204-00	CAP, 4.2-20 PF CERAMIC TRIM	ISM		1.000	EA
04	0053	3000-150-106	CAP 2.2 UF 10V TANT	3000-15X-10X	F	2.000	EA
08	0054	3000-150-101	CAP 10U/10V TANT	3000-15X-10X	F	1.000	EA
06	0055	3000-150-107	CAP,22UF,TANT.DIPPED	3000-15X-10X	F	4.000	EA
03	0056	914-1000-00	CAP,MONO CER TRIM 10-120PF 50V	ISM		1.000	EA
06	0058	961-045-70	DIODE, 1N457A	ISM		4.000	EA
08	0059	961-091-40	DIODE, 1N914	ISM		5.000	EA
07	0060	3000-230-101	DIODE ZENER	3000-230-101	F	1.000	EA
09	0061	3000-230-102	DIODE REF.	3000-23X-10X	L	1.000	EA
04	0062	961-075-41	DIODE, 1N754A	ISM		1.000	EA
07	0064	962-425-00	XSTR, 2N4250	ISM		1.000	EA
05	0069	3000-270-132	IC, AD737JN	3000-270-132	A	1.000	EA
03	0072	3000-370-352	SPRING CONTACT	3000-370-352	B	3.000	EA
06	0075	967-005-23	XTAL, 32.768 KHZ	ISM		1.000	EA
03	0077	3000-371-289	JACK,FORMED HDMX3 PL	3000-37X-289	A	3.000	EA
03	0078	3000-371-266	JACK,10A HDMX3PLT	3000-37X-266	A	2.000	EA
03	0079	3000-450-215	POLYTUBING 10A JACK	3000-450-215	A	1.000	EA
03	0081	1000-0325-00	CONNECTOR, MOLDED, 9V BATTERY	1000-0325-00	B	1.000	EA
03	0082	3000-450-212	SHIELD,ATTENUATOR	3000-450-212	B	1.000	EA
03	0083	973-3700-73	CONN. 2 PIN HEADER VERT MT.	ISM		1.000	EA
03	0084	3000-370-409	13/32" FUSE CLIP MX3	3000-370-409	C	2.000	EA
04	0085	3000-400-214	FUSE 600V 15A	3000-400-X14	C	1.000	EA
03	0086	3000-400-121	FUSE .25A/600V HDMX3	3000-400-121	A	1.000	EA
03	0087	3000-370-287	FUSE CLIP 1/4"(F2)	3000-370-287	A	2.000	EA
03	0088	3000-450-248	PAD,ATTENUATOR	3000-450-248	A	2.000	EA

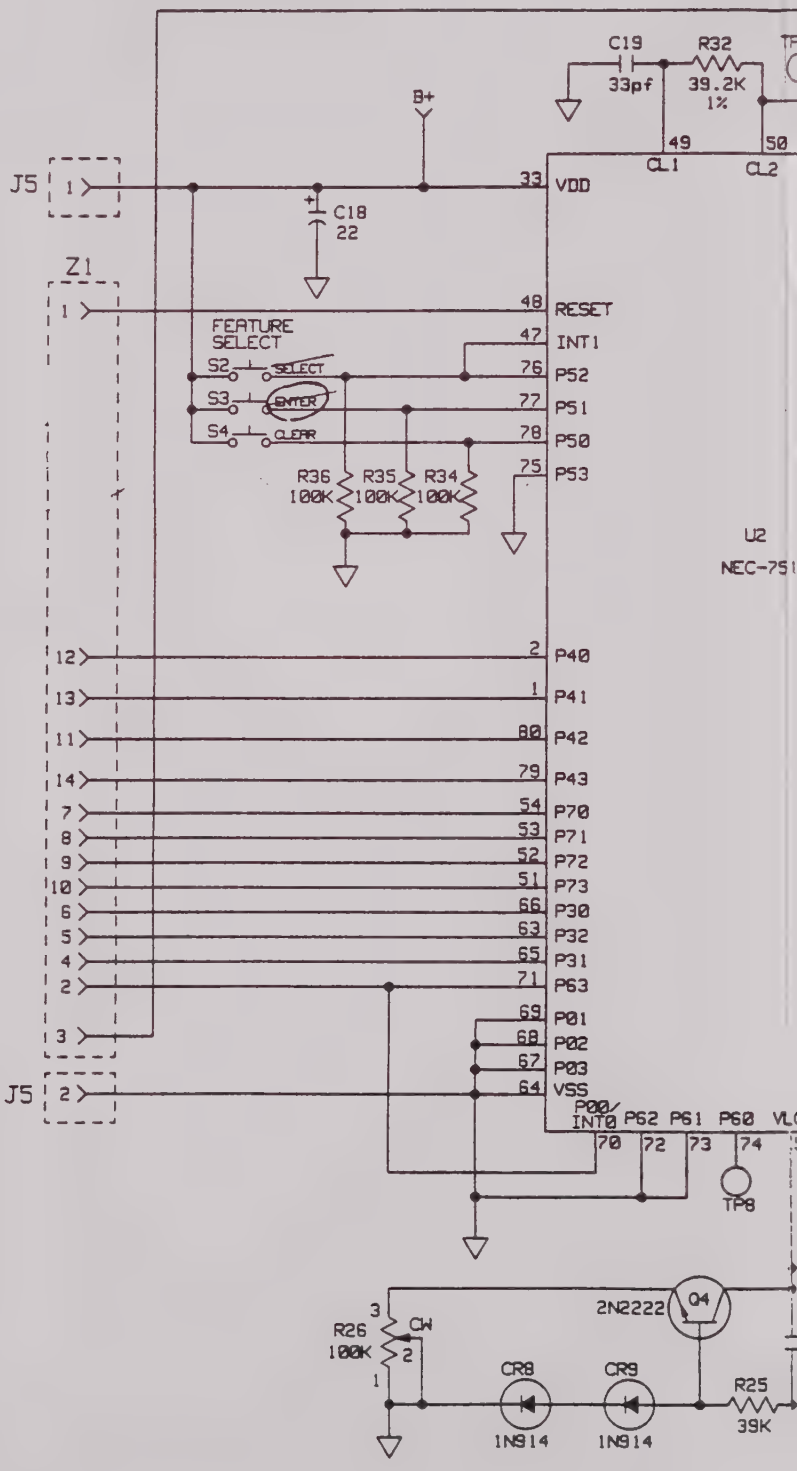
NOTES: UNLESS OTHERWISE SPECIFIED

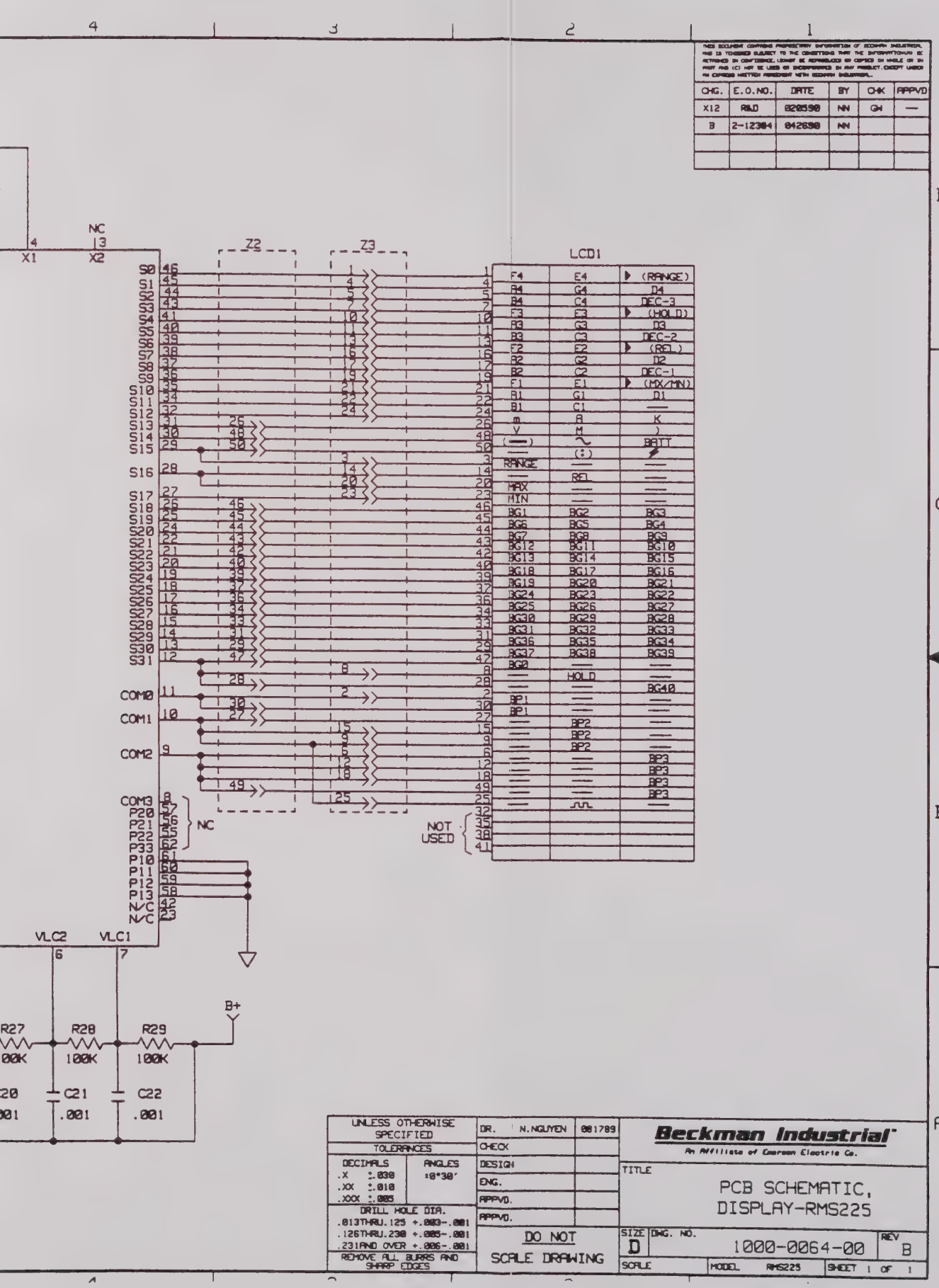
1. ALL RESISTORS VALUES ARE IN OHMS, 1/4W, 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. TEST POINTS AVAILABLE FROM SOLDER SIDE OF INPUT BOARD.
4. GROUND SYMBOLS ARE:

ANALOG GND

DIGITAL GND

REFERENCE DESIGNATORS	
LAST USED	NOT USED (SEE INPUT BD)
U2	U1
CR9	CR1-7
C22	C1-17
R36	R1-24,30,31
	R33
S4	S1
Z3	
J5	J1-4
LCD1	
TP9	TP1-7




4
3
2
1
D
C
B
A
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CHG. | E.O.NO. | DATE | BY | CHK | APPVD
X12 | R&D | 020590 | NN | CH | —
B | 2-12384 | 042890 | NN
UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS .X ±.030 .XX ±.010 .XXX ±.005
ANGLES ±0°30'
DRILL HOLE DIA. .013THRU.125 +.003-.001 .126THRU.230 +.005-.001 .231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES
DR. N.NGUYEN 081789
CHECK
DESIGN
ENG.
APPVD.
APPVD.
DO NOT SCALE DRAWING
Beckman Industrial
An Affiliate of Emerson Electric Co.
TITLE
PCB SCHEMATIC, DISPLAY-RMS225
SIZE D
DWG. NO. 1000-0064-00
REV B
SCALE
MODEL RMS225
SHEET 1 OF 1
X1
X2
NC
Z2
Z3
LCD1
S0
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S22
S23
S24
S25
S26
S27
S28
S29
S30
S31
COM0
COM1
COM2
COM3
P20
P21
P22
P33
P10
P11
P12
P13
N/C
N/C
NC
NOT USED
VLC2
VLC1
B+
R27
R28
R29
100K
100K
C21
C22
.001
.001
F4 E4 (RANGE)
B4 G4 D4
B4 C4 DEC-3
F3 E3 (HOLD)
B3 G3 D3
B3 C3 DEC-2
F2 E2 (REL)
B2 G2 D2
B2 C2 DEC-1
F1 E1 (MX/MN)
B1 G1 D1
B1 C1
m A K
V M)
BATT
RANGE
REL
MAX
MIN
BG1 BG2 BG3
BG6 BG5 BG4
BG7 BG8 BG9
BG12 BG11 BG10
BG13 BG14 BG15
BG18 BG17 BG16
BG19 BG20 BG21
BG24 BG23 BG22
BG25 BG26 BG27
BG30 BG29 BG28
BG31 BG32 BG33
BG36 BG35 BG34
BG37 BG38 BG39
BG0
HOLD
BG40
BP1
BP2
BP3

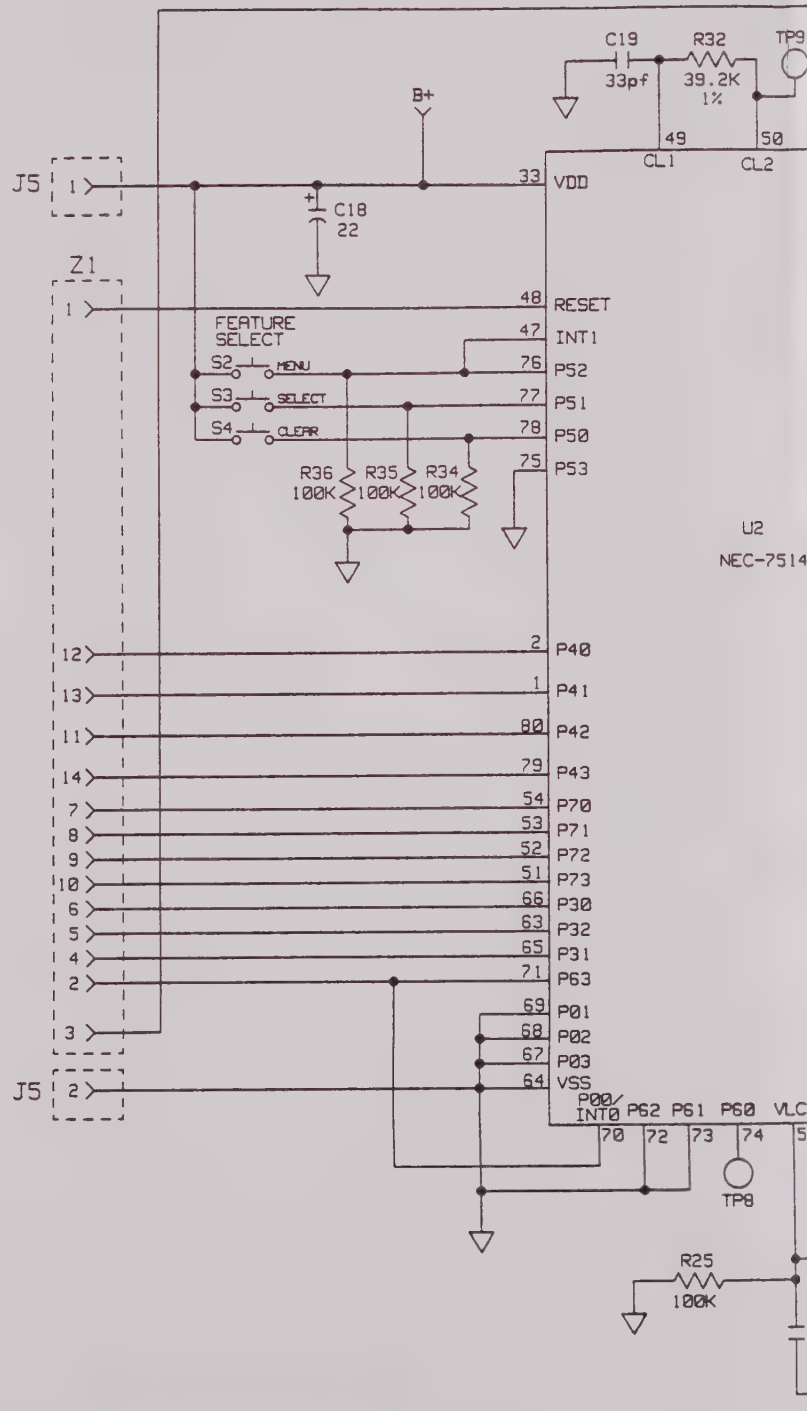
NOTES: UNLESS OTHERWISE SPECIFIED

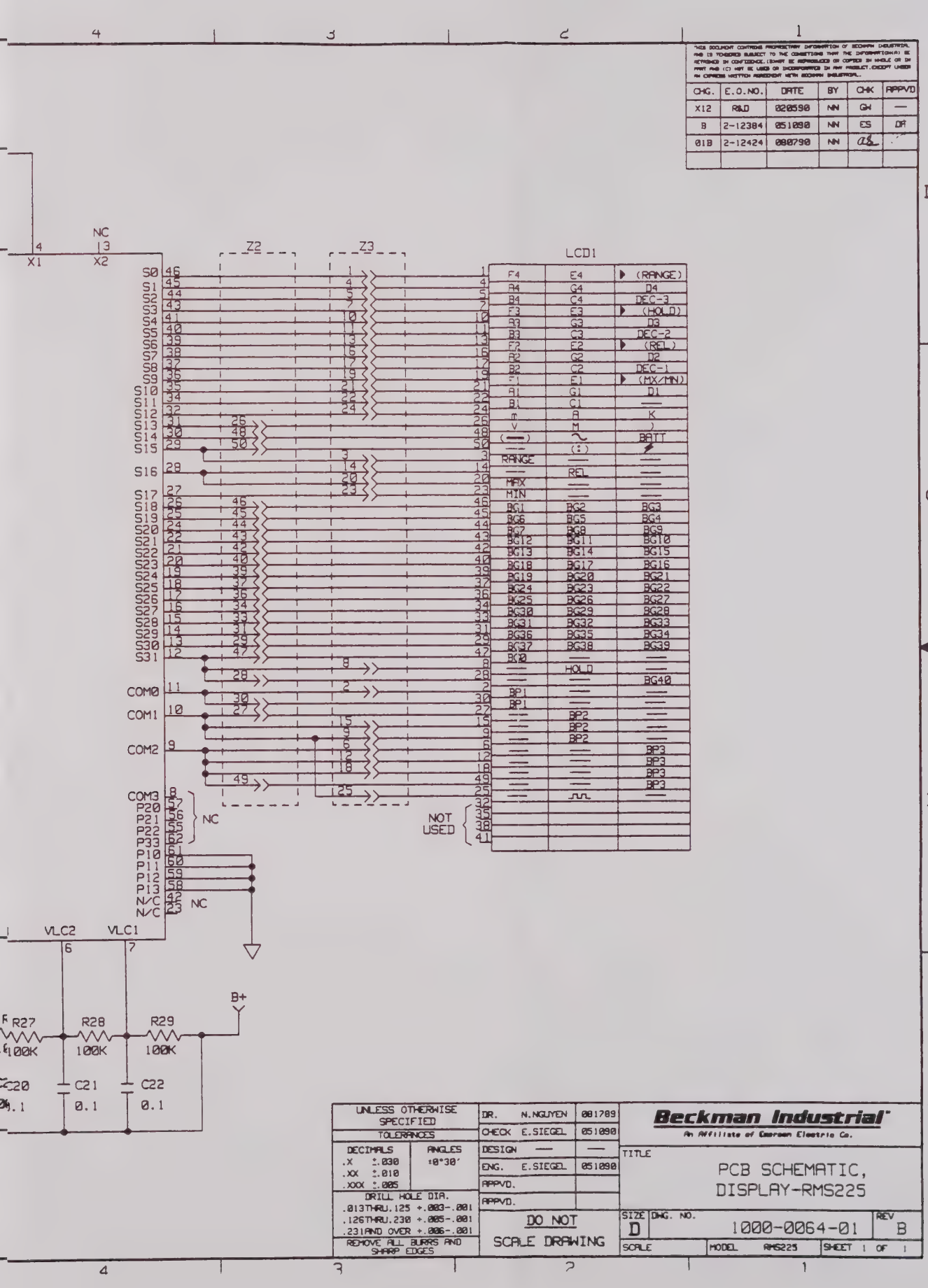
1. ALL RESISTORS VALUES ARE IN OHMS, 1/4W, 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. TEST POINTS AVAILABLE FROM SOLDER SIDE OF INPUT BOARD.
4. GROUND SYMBOLS ARE:

ANALOG GND

DIGITAL GND

REFERENCE DESIGNATORS	
LAST USED	NOT USED (SEE INPUT BD)
U2	U1
C22	C1-17
R36	R1-24,30,31
	R33
S4	S1
Z3	
J5	J1-4
LCD1	
TP9	TP1-7

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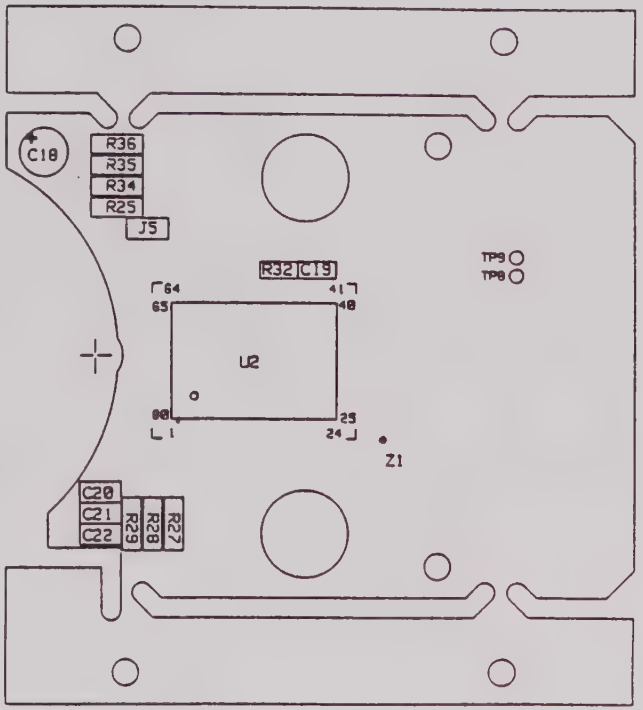
CHG. | E.O.NO. | DATE | BY | CHK | APPVD
X12 | R&D | 020590 | NN | GH | —
B | 2-12384 | 051090 | NN | ES | DA
01B | 2-12424 | 080790 | NN | AS
NC
X1
X2
Z2
Z3
LCD1
S0
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11
S12
S13
S14
S15
S16
S17
S18
S19
S20
S21
S22
S23
S24
S25
S26
S27
S28
S29
S30
S31
COM0
COM1
COM2
COM3
P20
P21
P22
P33
P10
P11
P12
P13
N/C
N/C
NC
NOT USED
F4 E4 (RANGE)
B4 G4 D4
B4 C4 DEC-3
F3 E3 (HOLD)
B3 G3 D3
B3 C3 DEC-2
F2 E2 (REL)
B2 G2 D2
B2 C2 DEC-1
F1 E1 (MX/MN)
B1 G1 D1
B1 C1
A K
V M
BATT
RANGE
REL
MAX
MIN
BG1 BG2 BG3
BG6 BG5 BG4
BG7 BG8 BG9
BG12 BG11 BG10
BG13 BG14 BG15
BG18 BG17 BG16
BG19 BG20 BG21
BG24 BG23 BG22
BG25 BG26 BG27
BG30 BG29 BG28
BG31 BG32 BG33
BG36 BG35 BG34
BG37 BG38 BG39
BG0
HOLD
BG40
BP1
BP1
BP2
BP2
BP2
BP3
BP3
BP3
BP3
VLC2
VLC1
B+
R27 100K
R28 100K
R29 100K
C20 0.1
C21 0.1
C22 0.1
UNLESS OTHERWISE SPECIFIED
TOLERANCES
DECIMALS .X ±.030 .XX ±.010 .XXX ±.005
ANGLES ±0°30'
DRILL HOLE DIA. .013THRU.125 +.003-.001 .126THRU.230 +.005-.001 .231AND OVER +.006-.001
REMOVE ALL BURRS AND SHARP EDGES
DR. N.NGUYEN 081789
CHECK E.SIEGEL 051090
DESIGN — —
ENG. E.SIEGEL 051090
APPVD.
APPVD.
DO NOT SCALE DRAWING
Beckman Industrial
An Affiliate of Emerson Electric Co.
TITLE
PCB SCHEMATIC, DISPLAY-RMS225
SIZE D
DWG. NO. 1000-0064-01
REV B
SCALE
MODEL RMS225
SHEET 1 OF 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. FOR MATERIAL LIST SEE SHEET 2.
2. SEE 1000-0064-01 FOR SCHEMATIC.



CHG	E.C.N.O.	DATE	BY	CHK	APPVD
C	450	4/8/88	LS	LS	—
D	2-112884	11/28/84	MH	LS	LS
D10	2-121484	12/14/84	MH	AL	✓

DO NOT SCALE DRAWING

Beckman Industrial

TITLE: PCB ASSEMBLY-DISPLAY-RMS225

SIZE: D | DWG. NO. 1000-0063-01 | REV. B

SCALE: — | SHEET 1 OF 1

NOTES: UNLESS OTHERWISE SPECIFIED

1. ASSEMBLY REQUIREMENTS

A. THE CHIPS ARE EXTREMELY SENSITIVE TO ELECTROSTATIC DISSIPATION. MAXIMUM E S D CONTROLS ARE REQUIRED DURING ASSEMBLY.

B. BOARD ASSEMBLIES ARE REQUIRED TO BE PLACED INTO OHM-SHIELD, SHIELDING BAGS, AFTER ASSEMBLY AND DURING SHIPMENT.

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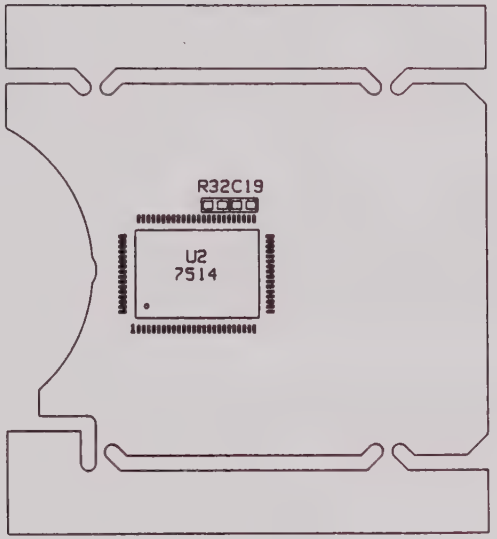
CHG.	E.O.NO.	DATE	BY	CHK	APPVD
X1	R & D	121589	NN	LO	—
B	2-12384	042690	NN	LO	DF
B1B	2-12424	080890	NN	gs	



ITEM	REF.DES.	PART NO.	DESCRIPTION	QTY
4	R32	S924-4392-02	RES, CHIP (0805) 1/8W 1% 39.2K	1
3	C19	S901-0133-00	CAP, CHIP (0805) NPO 50V 33PF	1
2	U2	S965-5590-14	IC, SMT, 7514 MICROCOMPUTER	1
1	—	1000-0062-01	PCB DISPLAY - RMS225	1

UNLESS OTHERWISE SPECIFIED

TOLERANCES

DECIMALS: .X ±.030, .XX ±.010, .XXX ±.005

ANGLES ±0°30'

DRILL HOLE DIA.
.013THRU.125 +.003-.001
.126THRU.230 +.005-.001
.231AND OVER +.006-.001

REMOVE ALL BURRS AND SHARP EDGES

DR.	N.NGUYEN	121589
CHECK	L.OFTEDAHL	042790
DESIGN	—	—
ENG.	E.SIEGEL	043090
APPVD.	—	—
APPVD.	D.FITZGERALD	050190

DO NOT SCALE DRAWING

Beckman Industrial
An Affiliate of Emerson Electric Co.

TITLE: PCB ASSY, SMT DISPLAY - RMS225

SIZE C | DWG. NO. 1000-0141-01 | REV B

SCALE 2X | MODEL RMS225 | SHEET 1 OF 1

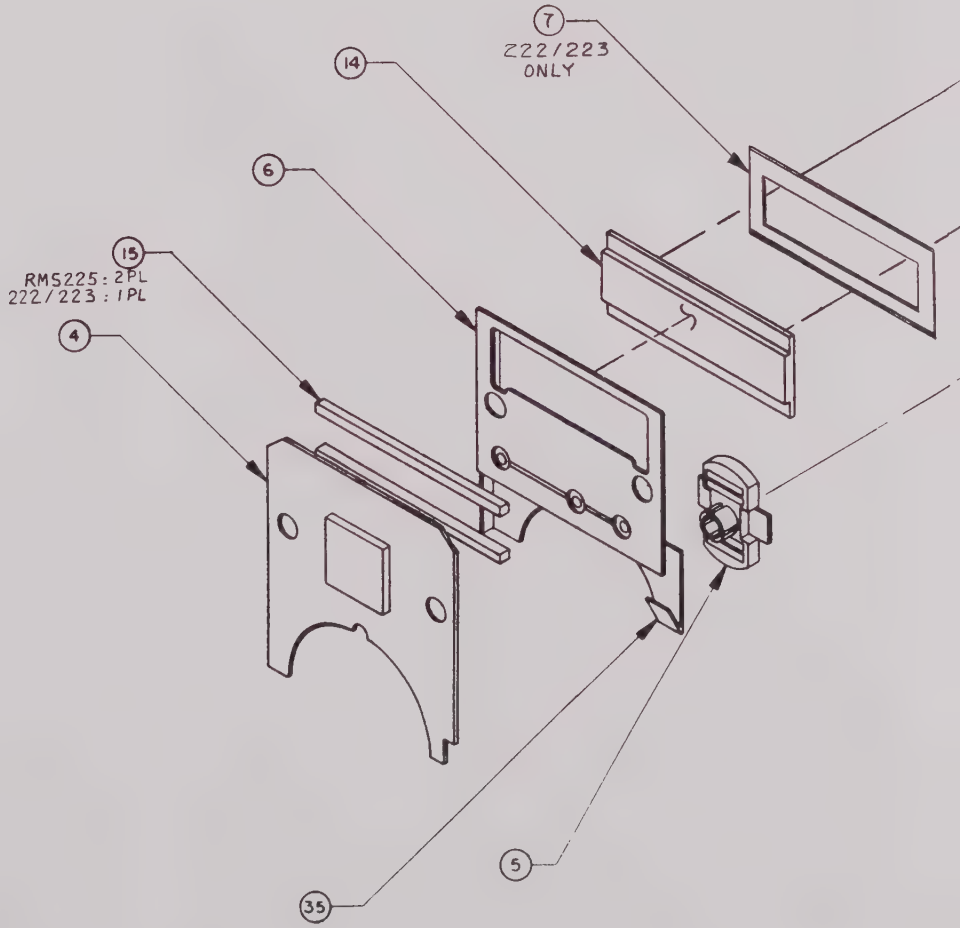
NOTES: UNLESS OTHERWISE SPECIFIED

(1) INSTALL ITEM 30 OVER SCREW (ITEM 23) PRIOR TO SEALING UNIT.

(2) INSTALL WARNING LABEL ON RECESS INDICATED.

3 FOR PARTS LIST SEE TABULATION CHART:

MODEL	T/A NO.
RMS225	1000-0065-XX
DMM222	1000-0333-XX
DMM223	1000-0334-XX



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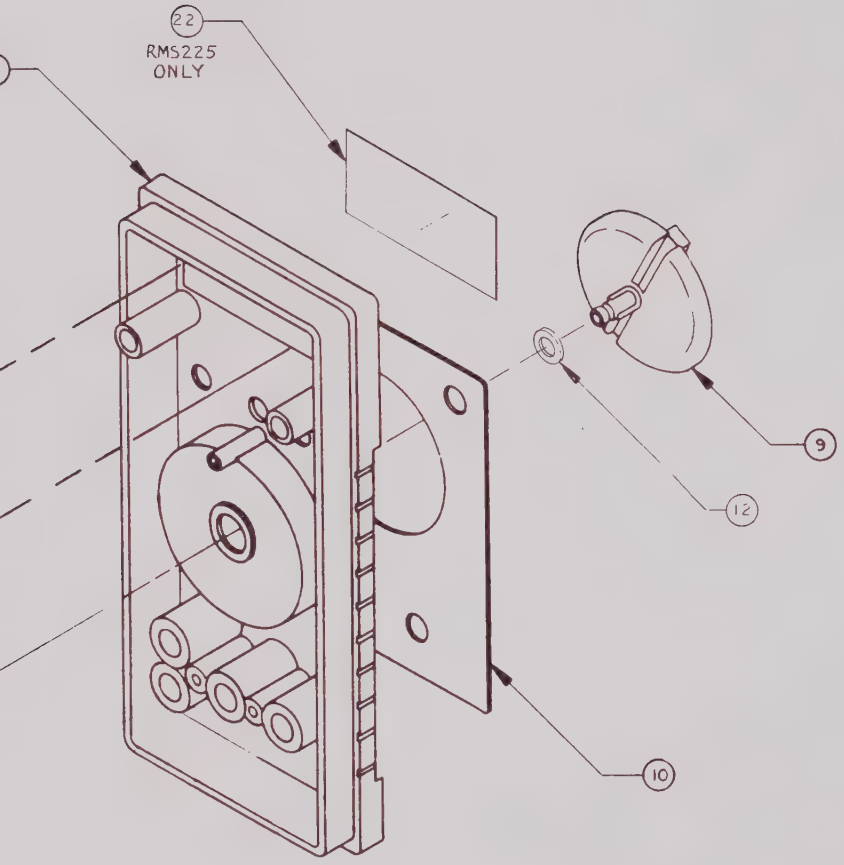
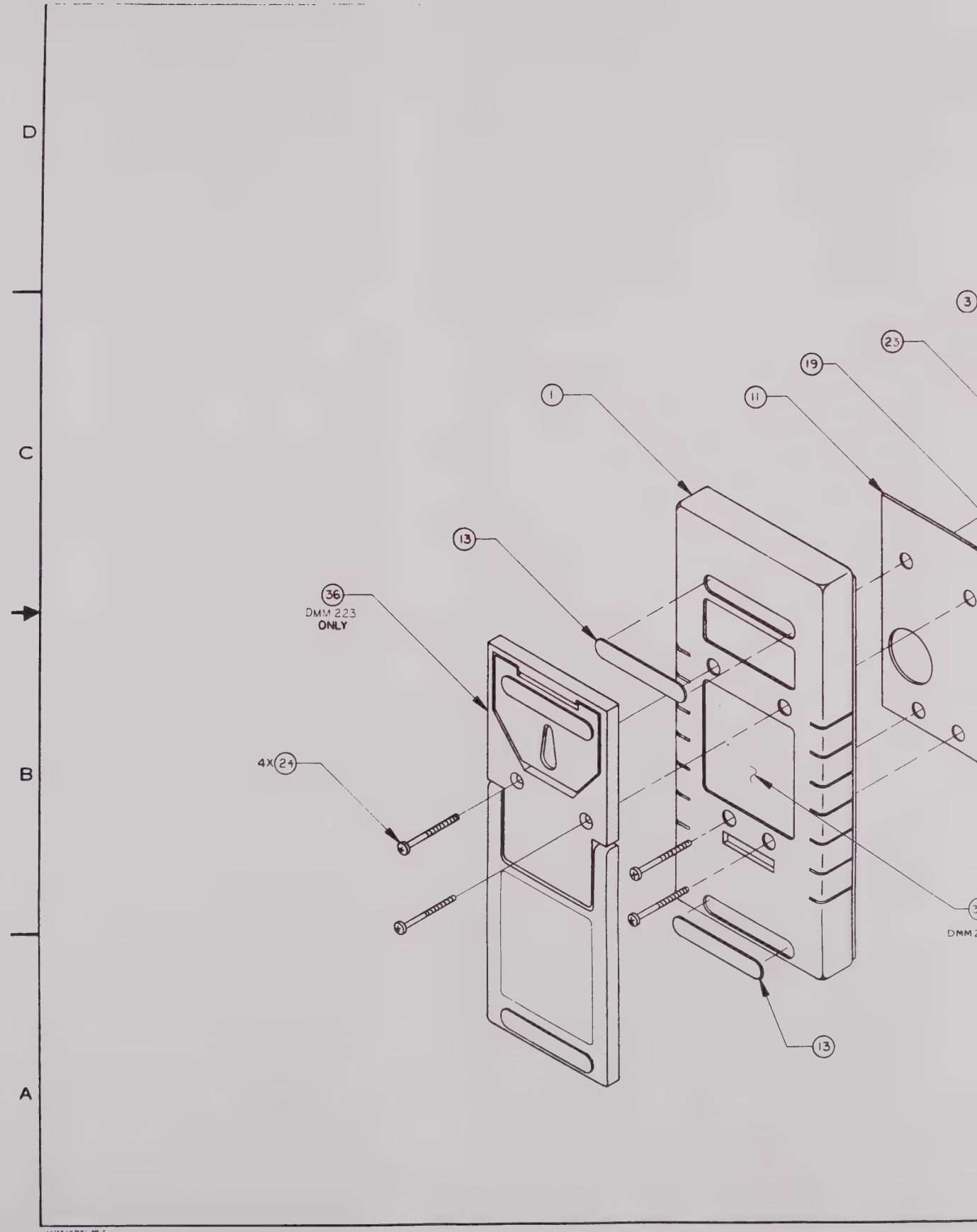
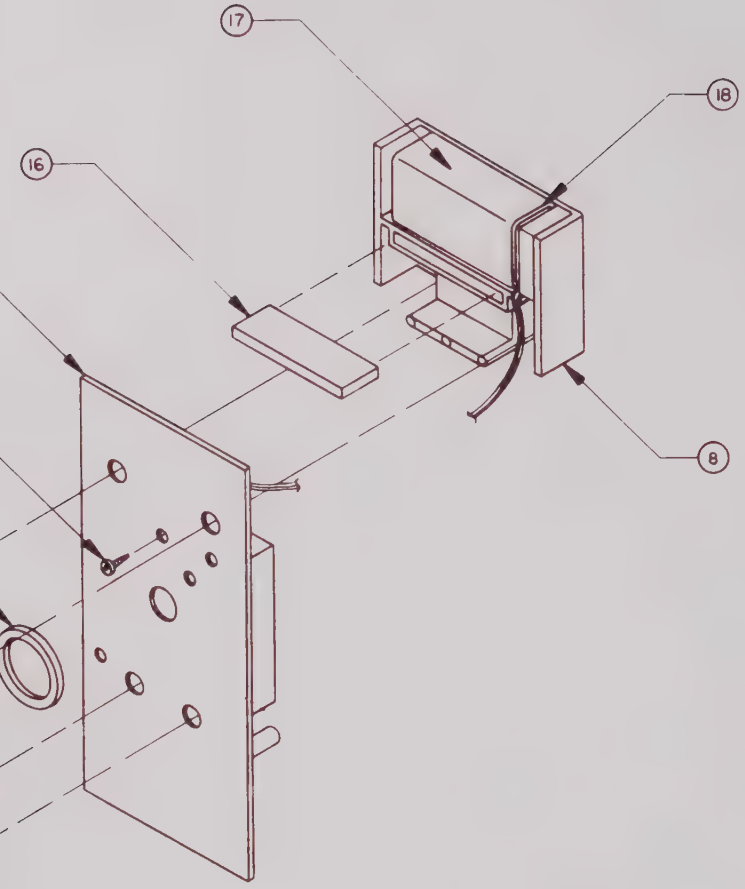
CHG.	E.O.NO.	DATE	BY	CHK	APPVD
B	2-12384	18 APR 90	AP		
C	2-12475	15 JAN 91	NN		
D	2-12489	11 MAR 91	NN		



UNLESS OTHERWISE SPECIFIED	DR. ALVIN TEH	4-77	**Beckman Industrial™** An Affiliate of Emerson Electric Co.
TOLERANCES	CHECK		
DECIMALS: .X ±.030, .XX ±.010, .XXX ±.005 — ANGLES: ±0°30′	DESIGN		TITLE: PICTORIAL, 22X
	ENG.		
	APPVD.		
DRILL HOLE DIA. .013 THRU .125 +.003 -.001; .126 THRU .230 +.005 -.001; .231 AND OVER +.006 -.001	APPVD.	4/19	SIZE: D — DWG. NO.: 1000-0063-00 — REV: D
REMOVE ALL BURRS AND SHARP EDGES	DO NOT SCALE DRAWING		SCALE: N/A — MODEL: 22X — SHEET 1 OF 3


D
C
B
A
3
23
19
1
11
13
36
DMM 223
ONLY
4X 24
13



23

SIZE	DWG NO.	REV
D	1000-0069-00	D
SCALE ——	MODEL 22X	SHEET 2 OF 3

DRAWING TITLE		MODEL NO.		DATE	SHEET
PCB ASSY, DISPLAY - RMS225		RMS225		08/08/90	2 of 2
ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS	
1	PCB SCH, DISPLAY - RMS225	1000-0064-01	0		
2	PCB ASSY, SMT, DISPLAY - RMS225	1000-0141-01	1		
3					
4	RES, CARBON 1/4W, 5%, 100K	942-201-04	7	R25,27,28,29,34-36	
5					
6					
7					
8					
9					
10					
11					
12					
13					
14	CONN, FEMALE, 2 PIN	973-3700-27	1	J5	
15					
16	CAP, MONOLITHIC RADIAL, .1 uf	3000-110-201	3	C20,21,22	
17	CAP, TANT, 10V, 22uf	3000-150-107	1	C18	
18					
19					
20					
21					
22					

DRAWING TITLE PCB ASSY, SMT, DISPLAY - RMS225		MODEL NO. RMS225		DATE 06/06/91	SHEET 2 of 2
ITEM	DRAWING TITLE	DRAWING NO.	REQ.	REMARKS	
1	PCB, DISPLAY - RMS225	1000-0062-01	1		
2	NEC 7514 MICROCOMPUTER SPEC.	1000-0093-01	1	U2	
3	CAP, CHIP (0805) NPO, 50V, 33PF	981-0133-005	1	C19	
4	RES, MF, 1/10W, 1%, 39200 OHMS.	924-4392-02S	1	R32	

LL CD	SEQ NO.	COMPONENT ITEM NO.	DESCRIPTION	ENGINEERING DRAWING NUMBER		QUANTITY PER	ITEM UM
02	0001	1000-0064-01	SCH. PCB, DISPLAY RMS225	1000-0064-01	B	.000	EA
03	0002	1000-0141-01	PCB ASSY., SMT DISPLAY RMS225	1000-0141-01	B	1.000	EA
06	0004	642-211-04	RES. CARBON 100K, 1/4W,5%	ISM		7.000	EA
16	0014	873-3730-07	CONN,2 PIN FEMALE			1.000	EA
04	0016	3000-110-001	CAP .1U/80,20%	3000-11X-2XX	A	3.000	EA
06	0017	3000-150-107	CAP,22UF,TANT.DIPPED	3000-15X-10X	F	1.000	EA

Read the 3 Year Warranty Against Defects located in the Servicing Policy section of this manual before requesting warranty or non-warranty repairs.

Please note that all authorized service centers are NOT REQUIRED to abide by the factory flat fee policy. Please contact each center for estimates.

Shipping Instructions

A multimeter returned for calibration or repair should be shipped with the following: your company name (if applicable), your name, address, telephone number, proof of purchase (for warranty repairs), a description of the problem encountered or service required, and the test leads currently being used with the meter.

Ship the multimeter in a sturdy box to the following address:

For U.S.A.:
Beckman Industrial Corp.
3883 Ruffin Road, Suite A
San Diego, CA 92123-1898

For U.K.:
Beckman Industrial, Ltd.
Queensway, Glenrothes Fife
Scotland KY7-5PU

For Canada:
(Refer to Service Centers in this section.)

Service Centers – United States of America

Alabama
Arnolds Instrumentation
3258 Spring Hill Road
Mobile, AL 36607
(205) 478-3230

California
Beckman Industrial Corp.
3883 Ruffin Road, Suite A
San Diego, CA 92123-1898
(619) 495-3310 Tlx: 249031

Standard Meter Labs
236 Rickenbacher Circle
Livermore, CA 94550
(415) 449-0220

Colorado
Instrument Repair Labs
2100 W. 6th Avenue #A
Broomfield, CO 80020
(303) 469-5375

Georgia
Peach State Instruments
108 Kipling Drive
Marietta, GA 30067
(404) 971-5050

Illinois
Metermaster, Inc.
2055 Army Trail Road, Suite A
Addison, IL 60101
(708) 268-8100

Indiana
Electro Lab Services
1302 N. Fulton Avenue
Evansville, IN 47712
(812) 423-5211

Louisiana
Industrial Instrument Works
5745 Salmen Avenue
Harahan, LA 70123
(504) 733-8355

Maryland
EIL Instruments
10 Loveton Circle
Sparks, MD 21152
(301) 771-4800

Massachusettes
Electra Test
20 Republic Road
N. Billerica, MA 01862
(508) 667-8541

EIL Instruments
21 'A' Street
Burlington, MA 01803
(617) 272-9450

Minnesota
Instrumentation Services
957 Winnetka Avenue North
Minneapolis, MN 55427
(612) 544-8916

Missouri
Industrial Service Labs
1530 Page Industrial Blvd.
St. Louis, MO 63132
(314) 423-3141

New York
EIC Electronics
85 Avenue East
Rochester, NY 14621
(716) 544-4392

EIL Instruments
9020 Wehrle Drive
Clarence, NY 14031
(716) 634-8500

Instrument Mart
295 Community Drive
Great Neck, NY 11021
(516) 487-7430

Oklahoma
Central Instrument Labs
3158 S. 108th E. Avenue
Tulsa, OK 74146
(918) 622-0114

Ohio
Unitek
865 Cleveland Avenue
Columbus, OH 43201
(614) 291-9909

Oregon
Westcon, Inc.
5101 N. Interstate Avenue
Portland, OR 97217
(503) 283-0132

Pennsylvania
EIL Instruments, Inc.
701 Rodi Road
Pittsburgh, PA 15235
(412) 823-2255

Sunshine Instruments, Inc.
1810 Grant Avenue
Philadelphia, PA 19115
(215) 673-5600

Texas
EIL Instruments
7385 Ashcroft Street
Houston, TX 77081
(713) 271-3100

Metermaster, Inc.
3405 Express Drive
Garland, TX 75041
(214) 271-5671

Meters & Instruments
6428 Gulf Freeway
Houston, TX 77023
(713) 644-1631

Virginia
Metermetrics
7400 Whitepine Road
Richmond, VA 23227
(804) 275-1431

Washington
EIL Instruments
2883 152nd Avenue NE
Redmond, WA 98052
(206) 882-3222

Service Centers – Canada

Alberta
Kingsway Aviation
4238 91 'A' Street
Edmonton T6E 5V2
(403) 463-5264

British Columbia
Miller Instruments
55 East 5th Avenue
Vancouver V5T 1G7
(604) 876-7544

Manitoba
Probe Industrial Electronics
1874 Portage Avenue
Winnipeg R3J 0H2
(204) 885-9320

Ontario
BCS Electronics
980 Alness Street #7
Downsview M3J 2S2
(416) 661-5585

Quebec
Projean Ltd.
1332 Rue Belanger East
Montreal H2G 1A1
(514) 273-8331

Primo Instruments
11235 Boul. L'Archeveque
Montreal-Nord H1H 3A8
(514) 329-3242

Service Centers – Foreign

Angola
Technidata Ltd.
P.O. Box 1619
Rua Reverendo Agostinho Pedro
Neto 21-21A
LUANDA
Tel: 32025/32309 Tlx: 3019

Australia
Warburton Franki
32 Parramatta Road
LIDCOMBE, NSW2141
Tel: 61-02-648-5455
Fax: 61-02-647-1545

Austria
Lipschitz & Co. GmbH
Felbigergasse 38
1140 WIEN
Tel: 0222-940621 Tlx: 133378
Fax: 0222-944174

Bahrain
Al-Jishi Corporation
P.O. Box 617
Al-Khalifa Road
MANAMA
Tel: 253297 Tlx: 8371

Belgium
Mecotronic sa/nv
Nieuwelaan 58
1860 MEISE
Tel: 02-269 07 48 Tlx: 65602
Fax: 2699455

COMECON Countries (D.D.R., Czechoslovakia, Bulgaria, Romania, Poland)
C.A.T. Electro Ltd.
20 Haymarket Terrace
Edinburgh EH12 5JZ
Scotland, United Kingdom
Tel: 031-3467050 Tlx: 727563
Fax: 031-3467065

Denmark
T.O. Elektronik
Ballerup Byveg 222
BALLERUP 2750
Tel: 42-658200 Tlx: 35293
Fax: 42-680300

Egypt
Etico Scientific
3 Ahmed Heshmat Street
P.O. Box 1653
Zamalek, CAIRO
Tel: 403041/407733 Tlx: 93382

Finland
Dualtek OY
P.O. Box 14
ESPOO 02321
Tel: 90-801991 Tlx: 123369
Fax: 90-8019911

France
Beckman Industrial Sarl
1Bis Ave du Coteau
93220 GAGNY
Tel: (01) 43027606 Tlx: 212971
Fax: (01) 43817252

Germany
Beckman Industrial Components GmbH
Frankfurter Ring 115
8000 MÜNCHEN 40
Tel: (089) 38870 Tlx: 5216197
Fax: (089) 3887238

Greece
Micronics Ltd.
46 Kritis Street
16451 Argyrouspolis, ATHENS
Tel: 01-9914786 Tlx: 216574

Hungary
Dahms Elektronik
Wienerstrasse 287
8051 GRAZ, Austria
Tel: 316-64030 Tlx: 31099
Fax: 316-6403029

Iceland
Karl Asgeirsson Rafeindataeknir
P.O. Box 406
121 REYKJAVIK
Tel: 1-622884 Tlx: 946240
Ref: 19023785

Iran
Zeefax Ltd., Zeefax House
320 King Street
London W6 ORR, UK
Tel: 01-7487808 Tlx: 8813278
Fax: 01-7487188

Ireland
Neltronics Ltd.
John F. Kennedy Road
Naas Road
DUBLIN 12, EIRE
Tel: 503560 Tlx: 24837 Fax: 552789

Israel
Racom Electronics LTD.
P.O. Box 21120
TEL AVIV 61210
Tel: 03491922 Tlx: 33808
Fax: 03491576

Italy
Beckman Industrial Componenti Srl
Via Arese 11
20159 MILANO
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